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ABSTRACT

The study employed self-monitoring and a strategy for self-solicitation of feedback to improve and maintain work performance in integrated job settings (two restaurants in Eugene, Oregon) with seven severely handicapped young adults. Self-monitoring procedures included counting and recording units of work completed and the amount of time spent working daily on assigned tasks. Ss were trained on a strategy for evaluating their rate of work performance on job tasks and for soliciting supervisor feedback. Analysis of task errors revealed consistent patterns of errors only on the task involving scrubbing pots and pans. Findings suggested that practitioners should establish a measurement system, create a self-monitoring system that is manageable by individual workers, establish a system for self-evaluation and self-solicitation of supervisor feedback, implement a self-solicitation procedure when a maintenance problem is present, and periodically check the accuracy of worker self-monitoring. A 17-page bibliography is appended. (CL)

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MAINTAINING WORK RATE OF YOUTH WITH SEVERE HANDICAPS: THE EFFECTS OF SELF-MANAGEMENT

G008430020

by

DAVID MICHAEL MANK

A DISSERTATION

Presented to the Division of Special Education
and Rehabilitation
and the Graduate School of the University of Oregon
in partial fulfillment of the requirements
for the degree of
Doctor of Philosophy

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MAINTENANCE OF YOUTH WITH SEVERE HANDICAPS IN JOB SETTINGS: THE EFFECTS OF SELF-MANAGEMENT

Quarterly Report

Project # G 008430020

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1.2 Selection of Subjects	Completed.	Completed.
1.3 Informed Consents for Subjects	Completed before 7/1/85.	N/A
1.4 Hire & Train Trainers and Data Collectors	Completed by 7/1/85.	N/A
1.10 Project Meetings	Continue with project meetings.	Completed.
1.11 Meetings with Cooperating Agencies	Coordination meeting occurred at least weekly.	Completed.
1.12 Quarterly Report	Continue quarterly reports. Next report due 10/85.	This is the Final Report.
1.13 Project Evaluation Activities	Ongoing.	All research and activities completed.
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2.1 Conduct Study with All Subjects	Subject participation completed 6/85.	N/A
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Title: MAINTAINING WORK RATE OF YOUTH WITH SEVERE HANDICAPS: THE EFFECTS OF SELF-MANAGEMENT

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Dr. Robert H. Horner

Self-management procedures have been utilized to develop and maintain a variety of work skills for persons with severe disabilities. The use of self-management procedures in nonsegregated job settings, however, has been limited most often to self-instruction and antecedent conditions regulation. The present study employed self-monitoring and a strategy for self-solicitation of feedback to improve and maintain work performance in integrated job settings with young adults labeled severely handicapped. Self-monitoring procedures included counting and recording units of work completed and the amount of time spent working daily on assigned tasks. Subjects were trained on a strategy for evaluating their rate of work performance on job tasks and for soliciting supervisor feedback. The

results indicate that young adults with severe handicaps can accurately self-monitor and self-evaluate their work performance, and that self-solicitation of feedback resulted in improved performance and improved maintenance of performance when maintenance was a problem. Results are discussed in terms of conditions for using self-management procedures to maintain work rate in nonsegregated job settings.

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CHAPTER I

INTRODUCTION

Maintaining behavioral gains is at the heart of producing significant lifestyle changes for people with severe disabilities. This is particularly true when adolescents and adults with severe disabilities enter the working world. Successful employment results when a worker performs valued labor over extended periods of time with minimal supervision. To achieve this, behavioral procedures are needed to build adaptive vocational skills and to maintain these skills over time. At present, the technology for skill acquisition far outweighs the companion technology for maintenance.

Many years of research and demonstration programs show that persons with severe handicaps can learn complex job behaviors (e.g., Bellamy, Horner, & Inman, 1979; Crosson, 1966; Gold, 1972; Horner & McDonald, 1982; Rusch & Mithaug, 1980) and other kinds of functional behaviors (e.g., Adkins & Matson, 1980; Coon, Vogelsberg, & Williams, 1981; Sowers, Thompson, & Connis, 1979). There are numerous demonstrations that persons with severe handicaps can work

successfully in integrated job settings (M. Hill & Wehman, 1983; Mank, Rhodes, & Bellamy, in press; Rusch & Mithaug, 1980; Wehman, 1981). Too often, however, persons with severe handicaps are not able to maintain employment over even minimal periods of time (J. W. Hill et al., 1985; Sowers et al., 1979).

There is a significant need for the development of procedures and strategies to teach and maintain behaviors with persons who have severe handicaps. In recent years the use of self-management strategies has been suggested as one approach to achieve this end. The absence of such strategies is a serious problem that can preclude success in nonsegregated jobs. Yet, trainers and job coaches must use procedures likely to result in job success even though there is an absence of technology for maintaining behavior.

The present chapter: (a) provides a discussion of the status of employment opportunities for persons with severe handicaps, (b) summarizes literature related to the maintenance of behavior, (c) reviews and summarizes literature related to the use of self-management procedures to change and maintain behavior, (d) summarizes and discusses issues related to the use of self-management techniques in vocational settings with persons who have mental handicaps, and (e) defines the purpose of the present study.

Employment Opportunities for People With Severe Handicaps

The development of employment opportunities for people with severe handicaps is a logical implication of the principle of normalization (Nirje, 1969; Wolfensberger, 1972). This principle asserts that all persons should live and work in settings that are as culturally normative as possible. Work is a normal and respected part of adult life in these United States (Schrank, 1978; Turkel, 1972) and should be an option without regard to handicaps. An opportunity to work is an opportunity to earn money, to participate in the economic mainstream of life, and to enjoy the benefits of being a productive member of our society. It is unlikely that the benefits of employment can be achieved by substituting programs of continual preparation or volunteer efforts in community programs (Bellamy et al., 1984; Warnock, 1978). Any examination of the literature of other groups concerned with equal opportunity reveals a unifying concern with regular, paid work (e.g., MS Magazine, 1979). Historically, alternatives to work have been devised for persons with severe handicaps (Bellamy, Sheehan, Horner, & Boles, 1980). But, rather than devising alternatives to employment, innovative

structures are needed which allow persons with severe handicaps to gain access to employment opportunities.

Persons with severe handicaps often have been denied access to an opportunity to work on the assumption that their handicapping conditions are so severe as to preclude the capacity to work. As the deinstitutionalization movement of the 1960s occurred, numerous nonvocational day activity programs began operation to provide service to those persons considered unable to work productively and considered ineligible for vocational rehabilitation services (Bergman, 1976; Cortazzo, 1972).

Presently, it is estimated that more than 180,000 persons are served in day activity or work activity programs and earn about $1.00 per working day (Bellamy, Rhodes, Bourbeau, & Mank, in press). This is true despite repeated demonstrations of vocational potential and ability (Bellamy, Inman, & Yeates, 1978; M. Hill & Wehman, 1983; Horner & McDonald, 1982; Mank et al., in press).

While it seems clear that persons with severe handicaps can work productively, it is also clear that many such persons require ongoing support, training, and supervision in order to do so (Bellamy, Rhodes, & Albin, in press). The Federal Government has begun recently to provide leadership in creating supported employment opportunities

for persons with severe handicaps typically served by activity or work activity centers. A recent Federal initiative not only fosters employment opportunities for persons with severe handicaps but defines supported employment as paid employment with ongoing support which is provided in maximally-integrated settings rather than in large segregated settings (U.S. Department of Education, 1984). Successes of persons with severe handicaps have been demonstrated in a wide variety of supported employment options (Mank et al., in press; Wehman et al., 1982).

The logic of supported employment capitalizes on advances in the technology to train persons with severe mental disabilities and an emerging range of business structures for providing employment. Rather than excluding persons from employment on the basis of severity of handicap, supported employment options provide access to meaningful work and wages along with the necessary support and supervision which promote productivity. Such employment options include the following features: (a) extended employment support, (b) priority to persons with severe handicaps, (c) an emphasis on productivity and wages, (d) ongoing employment support, and (e) a range of employment alternatives.

Extended Employment Support

Supported employment is an extended service, not a transitional rehabilitation treatment. It is a work-oriented alternative to the long-term nonvocational services now provided in day activity and work activity programs, and an extended support alternative to short-term placement programs.

Priority to Individuals With Severe Handicaps

Supported employment is designed for individuals who are poorly served in traditional time-limited employment-preparation programs. Research and service data show that many individuals now in workshops and schools can be trained for competitive employment (M. Hill & Wehman, 1983; Sowers et al., 1979; Wehman, 1981; W. W. Williams & Vogelsberg, 1983). In light of this, supported employment should focus primarily on individuals with severe and profound handicaps.

Emphasis on Productivity and Wages

Supported employment is a work option rather than a social service or educational program. Therefore, the primary indices of program effectiveness are the productivity

levels of individuals and the wages that result. Supported employment is based on the belief that, because of the importance of work in our society, successful performance in a socially acceptable, adult work role will create opportunities for community participation that could not be achieved in therapy, education, or volunteer programs.

Ongoing Employment Support

A major employment-related expense is the additional cost of training and supervision. Only a handful of studies have demonstrated prolonged, high-rate production by workers with severe handicaps (Bellamy et al., 1978). Most of these studies have utilized specialized production supervision procedures that require more time and effort than are typically observed in either workshops or industries (Bellamy, 1976; Martin & Pallotta-Cornick, 1978). Ongoing access to training and supervision is required because, over time, workers in production setting may either begin to perform unacceptably on an assigned task or require training on new work tasks. Detailed procedures are available for the training and retraining needed in these circumstances. It is clear, however, that such training costs will usually exceed typical training programs in competitive industries. Support for extra

training and supervision activities is based on recognition that the performance of a worker as well as his or her access to work may vary over time, creating the ongoing need for services.

A Range of Employment Alternatives

None of the features of supported employment limits individuals with severe handicaps to employment in sheltered settings. Rather, these features outline the type of support needed for productive employment of individuals in any work setting. With supportive government policies, this can occur in: nonvocational adult day programs; extended employment programs in workshops; specialized industries (Cho & Schuermann, 1980); enclaves or special divisions of an industry (Cho, 1980; DuRand & Neufeldt, 1975); worker-owned cooperatives, in private industries; and under a variety of organizational structures.

Existing program options currently support implementation of supported work programs in sheltered sites performing benchwork assembly tasks (Bellamy et al., 1979; Horner & Bellamy, 1980), in crew labor situations (Bellamy & Rhodes, 1983), in a demonstration of individuals with severe handicaps working in an enclave with a Seattle-based electronics firm (Rhodes & Valenta, in press), and in

regular jobs (Wehman, 1981). Even with these developed options, it is clear that individuals with severe handicaps can learn to work in less restrictive environments only if long-term support is available for maintenance of learned work and work-related behaviors.

Integration is a key outcome of employment for people with severe disabilities. As such, employment in settings where most employees are not disabled is valued highly. A focus on the importance of integration fosters employment which is as similar as possible to open competitive employment. It has been argued that the most valued employment option is for one person with disabilities to work only with persons without identified disabilities (Brown et al., 1984). This approach goes beyond the limits of presently available technology for training and maintaining work behaviors for persons with severe handicaps. To date, procedures for the most effective learning call for individualized training (e.g., Wehman, 1981). Procedures for the maintenance of behaviors typically require for the continuous presence of external supervision.

If persons with severe handicaps are to gain access to employment which is maximally integrated, then the issue of maintenance of work behaviors in the absence of continuous supervision must be addressed (Helland, Paluck, & Klein,

1976; Wehman, 1981). With an emphasis on individual and integrated jobs, procedures are needed not only to teach job duties but also to maintain performance over time.

Maintenance of Vocational Behavior

The maintenance of learned behavior is a problem frequently noted in behavioral literature with persons who have severe handicaps (e.g., Koegel & Rincover, 1977; Wacker & Berg, in press; Wehman & Kregel, 1983). Unfortunately, the problem of maintenance is infrequently addressed. Although persons labeled severely handicapped can learn a wide array of complex work skills, all too often those acquired skills do not maintain long enough to facilitate new lifestyles (Gifford, Rusch, Martin, & White, 1984; Wehman, 1981). In normal job settings a lack of maintenance has been shown to interfere with successful remunerative employment (Greenspan & Shoultz, 1981; M. Hill & Wehman, 1983; Sowers, Rusch, Connis, & Cummings, 1980). A variety of factors appear to contribute to the loss of jobs (Wehman et al., 1982). One placement program notes that speed and quality of work performance accounted for 42% of job terminations (Food Service Vocational Program, 1981; Sowers et al., 1979).

There is only a small body of literature available to practitioners concerned with the maintenance of learned behavior by persons with severe handicaps. And, as might be expected, there is no clear technology for training and arranging contingencies to promote maintenance. However, in recent years, some attention has focused on defining and managing the problem of maintenance (Rusch, Martin, & White, in press; Wacker & Berg, in press). The present section (a) presents a functional definition of maintenance, (b) discusses variables related to maintenance, and (c) discusses methodology in maintenance research.

Maintenance Defined

The applied problem of maintenance focuses on the durability of stimulus control relationships over time. It is not "behavior" that "maintains"; it is the control exerted by specific stimuli that maintains (Horner, Bellamy, & Colvin, 1984). Drawing from literature in the experimental analysis of behavior, maintenance should be more precisely defined as the durability of a response under constant stimulus conditions (Honig, 1966). Whereas the precision offered by this definition focuses attention on stimulus control variables and suggests clear avenues for analysis of maintenance, it has little utility for

researchers who work in applied settings where constant stimulus conditions are rarely available. It is the inherent change of stimuli in applied settings that has led some applied researchers to include maintenance as a subclass of a broad definition of generalization. Stokes and Baer (1977) define generalization as: "the occurrence of relevant behavior under different, non-training conditions (i.e. across subjects, settings, people, behaviors and/or time)" (p. 350). This definition may be useful, but it does not suggest approaches for promoting maintenance. Later, Drabman, Hammer, and Rosenbaum (1979) extended the definition of maintenance in a "generalization map" of types of generalization. Their list of types of generalization includes "maintenance generalization" and "time generalization," both of which refer to continued appropriate responding after treatment.

The inclusion of maintenance as a subclass of generalization, however, carries its own drawbacks. Central among these is the assumption that a single group of variables contribute to all classes of generalization. Some authors have noted that the variables that contribute to maintenance are different from those variables typically associated with generalization (e.g., Koegel & Rincover, 1977; Wacker & Berg, in press; Walker & Buckley, 1972).

These writings suggest that maintenance is related to the presence of constant stimuli in the maintenance environment and the ongoing reinforcement contingencies available in the maintenance environment. By contrast, promoting generalization is more a function of the similarity between stimuli in training and generalization settings (Guttman & Kalish, 1956; Koegel & Rincover, 1977; Terrace, 1966). A distinct and separate definition of maintenance allows practitioners to identify and address specific variables leading to maintenance.

The definition offered by Horner et al. (1984) allows closer analysis of the variables influencing maintenance. They emphasize that attention must focus on the availability of constant discriminative stimuli and on the factors related to developing an enduring pattern of responding. The former suggests issues related to training, whereas the latter relates to reinforcement contingencies in the maintenance environment. Wacker and Berg (in press) similarly suggest that procedures related to responding over time must include management of constant antecedent cues and procedures for providing ongoing consequences. However, these authors also define maintenance as a type of generalization. The definition offered by Horner et al.

(1984) serves as a basis for addressing maintenance variables and related issues.

Perhaps the most critical aspect of socially-significant behavior change is that it endures over time. There are many instances in available literature where behavior change occurs but fails to maintain over time. This is true in weight control (Wooley, Wooley, & Dyrenforth, 1979) and addictive behaviors (Marlatt & Parks, 1982) as well as vocational behavior with persons with mental handicaps (J. W. Hill et al., 1985; Wehman, 1981).

In considering the problem of maintenance of work behaviors with persons with severe handicaps it must be assumed that in order to be considered functional, appropriate behaviors must maintain sufficiently to show continued performance over relatively long periods of time. Research addressing maintenance issues has focused on specific methods of manipulating antecedent events and consequent events.

Variables Affecting Maintenance

Wacker and Berg (in press) suggest three broad strategies for manipulation of consequent events related to maintenance with persons labeled mentally handicapped. These include naturally-maintaining consequences,

intermittent reinforcement schedules, and consequence regulation.

Naturally-maintaining consequences refer to using consequences available in the performance setting during and after training. Although such consequences may be insufficient for establishing stimulus control, using reinforcers known to be available in performance settings can enhance maintenance (Kazdin, 1975; Stokes & Baer, 1977). Precisely how consequences are provided can vary from externally-managed contingencies to individually-solicited reinforcers (Seymour & Stokes, 1976).

The use of intermittent reinforcers to maintain behavior is a frequently cited method of promoting maintenance (Ferster & Skinner, 1957; Rusch, Connis, & Sowers, 1978). Stokes and Baer (1977) describe procedures to promote maintenance over time under the rubric of using "indiscriminable contingencies." Rusch et al. (1978) and Kazdin & Polster (1973) reiterate that intermittent schedules of reinforcement are more likely to promote maintenance and delay any losses in responding than continuous schedules of reinforcement.

The regulation of consequences referred to by Wacker and Berg (in press) include contingencies managed by external agents and by the person responding. Several

studies have compared the use of self-delivered reinforcers with reinforcers delivered by external agents. For example, Helland et al. (1976) showed self-delivered reinforcers to be as effective as supervisor-delivered reinforcers to improve work performance by moderately and mildly retarded persons. McNally, Kompik, and Sherman (1984) increased productivity of employees with retardation using a package intervention including self-reinforcement. Horner, Lahren, Schwartz, O'Neill, and Hunter (1979) demonstrated increased productivity with an adult with severe retardation using a self-delivery of reward that was more effective than the same rewards delivered by supervisors.

The variables discussed by Wacker and Berg (in press) focus on consequences related to maintaining a response once it has been established. It does not include factors related to developing responses. Another way to analyze factors affecting maintenance, which includes response acquisition related to maintenance, is suggested by J. D. Williams and Horner (1984) who discuss three classes of variables related to maintenance: training variables, transfer variables, and performance variables.

Training is a process in which an individual learns how to perform certain responses and when those responses should be performed (i.e., establishing stimulus control).

To some extent, the stimulus control developed during training will maintain over time as a function of the level or strength of the stimulus control established during training (Engelmann & Carnine, 1982; Haring, Liberty, & White, 1980). Stimulus control must be established and the controlling stimuli must be present in the maintenance environment (Horner, Williams, & Knobbe, in press; Koegel & Rincover, 1977).

Transfer variables affecting maintenance reflect the extent to which training stimuli become performance stimuli after correct responding occurs during training. All antecedent stimuli such as trainer prompts and presence must be removed leaving only those stimuli present in the performance setting (Bellamy et al., 1979). All positive consequences must be faded to approximate the type, level, and schedule of consequences experienced in the performance setting. Finally, the frequency of opportunity for performing the behavior in question should gradually change from initial training levels needed to establish stimulus control to the levels naturally experienced in the performance setting (Koegel & Rincover, 1977).

Performance variables include those factors related to contingencies present after a response has developed. Most studies of variables that affect maintenance are those

associated with antecedent stimuli and with consequences in performance settings. Even assuming that adequate stimulus control has been established, behavior cannot be expected to continue without reinforcing consequences. Critical to promoting maintenance is determining the type, amount, schedule, and method of delivering consequences (Bellamy et al., 1978). Ongoing consequences must be present in addition to the absence of more powerful reinforcers for competing responses (Horner, Mank, & Albin, 1985).

From this analysis it is clear that maintenance procedures should include: training that builds strong, generalized stimulus control; a graduated transition once competence is demonstrated from training conditions to those conditions experienced in the natural performance setting; ongoing access to relevant antecedent stimuli; and effective consequences. The present technology of instruction for persons with severe handicaps has developed detailed procedures related to the first two elements--that is, establishing stimulus control and transfer of behaviors (e.g., Bellamy et al., 1979). Far less attention has been devoted to the arrangement of effective consequences over time. In addition, studies related to maintenance require different designs to isolate related variables.

Methodology in Maintenance Research

Few studies have employed procedures that document experimental control between maintained responding and an independent variable. In fact, one reason so little research has been focused on maintenance may be the comparative absence of a design methodology for studying the durability of behavior over time (Rusch & Kazdin, 1981). Most single-subject designs are directed at evaluating the effects of an independent variable on promoting behavior change rather than response maintenance. Maintenance typically is added as a demonstrated effect, but is not included as an effect that can be functionally related to the independent variable. Rusch and Kazdin (1981) suggest that designs can and should be used to isolate the effects of interventions on maintenance. Such designs focus on the use of the sequential withdrawal of the components of package interventions, the use of multiple-baseline designs across behaviors over time, and the use of reversals. As Rusch and Kazdin (1981) point out, many studies have addressed the issue of maintenance through follow-up measures relying only on the hope that behavior change will be maintained.

Experimental designs are needed which have maintenance as the focus, if variables related to maintenance are to be

analyzed. Since there is evidence that behavior change or acquisition variables are different from the variables related to maintenance, then designs must be employed which focus on maintenance issues.

Even in the absence of clear designs for assessing the impact of interventions on maintenance, researchers have addressed the issue of maintenance, recognizing that it is critical that behavior change endures over time. To date the most effective strategies for maintaining work behavior for persons with severe handicaps have required the presence of intensive supervision in segregated, sheltered settings (Bellamy, 1976; Bellamy, Inman, & Schwarz, 1977; Martin & Pallotta-Cornick, 1978; Martin, Pallotta-Cornick, Johnstone, & Goyos, 1980; McNally et al., 1984). The natural consequences and prompts available in realistic, integrated jobs have not proven sufficient to maintain work behavior with persons who are severely handicapped. What is needed are effective strategies for consequences that can be provided without continuous supervisor presence in nonsegregated job settings in addition to designs which focus on assessing maintenance. The use of self-management or self-control procedures holds promise in meeting this need. As noted earlier in this section, some researchers have utilized a variety of self-management strategies to

address behavior change and maintenance. The following section examines this literature.

Self-Management

Self-management refers to an individual engaging in a response or responses to monitor or manage his or her own behavior (Litrownik, 1982). This definition is consistent with that of Brigham (1982) who describes self-management as a particular type of response repertoire displayed by an individual to manage some aspect of his or her own behavior. Brigham's (1982) definition further separates self-management from self-control. Whereas self-control refers more to a personal attribute, self-management refers to the behaviors of an individual in management of one's own behavior. Litrownik (1982) provides additional definition noting that "the self-management process includes a series of actions or operations that contribute to the independent and self-directed performance of targeted outcomes" (p. 322). The behaviors included as self-management techniques are many and varied. These include self-assessment, self-recording or self-monitoring, prearrangement of stimuli or consequences, self-determined reinforcement, self-delivered reinforcers, self-determined

and self-delivered punishment, self-modeling, and self-instruction (Mahoney & Thoresen, 1974).

Self-management techniques have been used for both overt and covert behaviors and have been employed with people of all ages with many target behaviors (Karoly, 1982). The present section reviews literature related to the use of self-management practices. It includes descriptions of techniques under the rubric of self-management, examines self-management practices with persons with mental retardation, and reviews literature in self-management with persons with mental retardation in work settings.

Self-Management Techniques

A number of approaches to self-management are offered in the professional literature, all of which can be interpreted as compatible with behavioral approaches. Brigham (1982) provides a radical behavioral perspective which suggests that self-management or self-control behaviors are developed and maintained by consequences, as are other behaviors. Whereas some radical behaviorists focus on the environment's impact on the behavior of an individual (Rachlin, 1974), Brigham (1982) suggests that not only is the behavior of an individual affected by the environment but that an individual can change or have an

impact on his or her environment thereby affecting the consequences and conditions of behavior.

Kanfer and Karoly's (1982) cognitive-behavioral approach suggests a broader perspective. In this view an individual may not be affected only by external consequences but also through cognitive and thought processes. This can include internal actions or covert behaviors.

Carver and Scheier (1982) offer an information-processing perspective of self-management. These authors describe personal control systems as cybernetic functions wherein input is gathered, a comparison is made against some standard, behavior occurs, and then the consequences of the behavior are assessed. These authors suggest that while such a model is inherent in such areas as homeostatic functions, it is also implicit in behavioral self-management. In addition, Carver and Scheier (1982) suggest that the radical behaviorist viewpoint is moving toward a feedback loop or cybernetic concept.

Each of the preceding models of self-management processes offers a somewhat different world view and approach to changing or maintaining behavior. However, each model also focuses on the participatory role of the individual in effecting behavior change. To some extent, many self-management studies can be interpreted in the

context of more than one theoretical model. From these and other models have emerged a variety of self-management techniques.

In general, self-management includes techniques associated with assessing some aspect of one's own behavior, comparing that behavior against some standard (externally or internally determined), and providing some kind of differential consequence (which also may be controlled by external agents or by the individual). However, from these basic components numerous techniques can be identified which can be employed individually or in a multitude of combinations. Many of these self-management procedures have been employed with persons with handicaps. E. S. Shapiro (1981) and Litrownik (1982) provide reviews of practices in the use of self-management with persons with mental disabilities. The remainder of this section describes a number of self-management techniques and provides a general overview of their application with persons labeled mentally disabled.

Self-Monitoring

Self-monitoring refers to behaviors associated with identifying one's own behavior, detecting the occurrences of a behavior, and recording whether or not the behavior

in question has occurred (Kendall & Williams, 1982). Self-monitoring is considered a first step of most self-management interventions (Mahoney & Thoresen, 1974). Self-monitoring requires that the target behavior be defined in a way so as the individual can detect whether or not it has occurred. Once operationally defined, an individual can commence some method of recording occurrences.

Self-monitoring has been included as a part of self-management interventions for children (Kendall & Williams, 1982; Kunzelmann, 1970) and used with covert behaviors (Mahoney & Thoresen, 1974), interpersonal skills (McFall & Dodge, 1982), academic behavior (Mahoney, Moore, Wade, & Moura, 1973), and weight control (Castro & Rachlin, 1980). Self-monitoring also has been used as a portion of interventions with persons with mental retardation (e.g., Dennis & Mueller, 1981; H. J. Jackson & Boag, 1981). Attention has been devoted to both the accuracy of self-monitoring (e.g., Fixsen, Phillips, & Wolf, 1972; Ober, 1968) and to reactivity in self-monitoring procedures (e.g., Herbert & Baer, 1972).

Even though self-monitoring often is only a part of a larger self-management intervention, it also has been shown to affect behaviors (Mahoney & Thoresen, 1974). In some studies, the recording of behavior appears to increase the

occurrence of desirable behaviors and decrease undesirable behaviors (Liberty, 1984). However, self-monitoring alone as a behavior change strategy appears to have only temporary effects (Kazdin, 1974).

Self-monitoring procedures have been employed in a number of settings with persons with mental handicaps. The results of these studies are consistent with self-monitoring research with nonhandicapped subjects. Liberty (1984) provides a review of a number of studies using self-monitoring procedures. Self-monitoring procedures have been used alone and in conjunction with such procedures as the self-delivery of reinforcers and the use of antecedent cues. Self-monitoring or self-recording was used by Zohn and Bornstein (1980) to increase production rates in a sheltered workshop. Horner and Brigham (1979) used a self-monitoring procedure in addition to self-delivery of reinforcers to successfully improve on-task behavior in a classroom setting. Other researchers have compared self-monitoring to other self-management procedures with mixed results (Hanel & Martin, 1980; Rosenbaum & Drabman, 1979; Srikameswaran & Martin, 1984).

It is not surprising that most self-management studies have employed self-monitoring as at least a portion of the intervention since self-monitoring is required for use of

other self-management procedures. However, there is conflicting evidence regarding the effects of self-monitoring in isolation. Reactivity to the use of self-monitoring may account for a change in target behaviors using self-monitoring alone. Horner and Brigham (1979) showed a temporary effect on a target behavior (on-task behavior) using self-monitoring alone, yet other studies suggest self-monitoring alone is effective in changing a target behavior (e.g., Zohn & Bornstein, 1980). Shafer and Brooke (1984) used self-recording in job settings to increase on-time behavior with adults with mild retardation. Reiter, Mabee, and McLaughlin (1985) used self-monitoring of on-task behavior with a second-grade student with learning disabilities. The two intervention phases were 17 days each. The subject showed an increase in on-task behavior and a decrease in time to complete assignments. However, this study is difficult to interpret since means were the only data reported; graphs and trends were not available.

Liberty (1984) suggests at least three issues related to the degree to which self-monitoring may influence the target response. First, the direction of the desired change in the target behavior may affect the target behavior. That is, behaviors viewed as positive or desired are more likely to increase as a result of self-monitoring.

Second, whether or not the observation of subjects engaged in self-monitoring is overt may have an impact on target behaviors. This suggests that under overt observations, the subjects' behaviors are more likely to change in the desired direction. Third, whether or not the reliability of subject self-monitoring. Liberty (1984) notes that a relationship has not been established between the accuracy of self-monitoring and changes in target behaviors. Therefore, self-monitoring accuracy may not need to be high in order for it to affect target behaviors.

Related to the first of Liberty's (1984) issues, Litrownik and Freitas (1980) investigated reactivity and accuracy of self-monitoring with adolescents who were mentally retarded. Their results suggest that self-recording of positive or desirable behavior was more reactive than self-recording of negative behaviors.

Self-monitoring of a behavior by an individual has taken on many different forms in studies with persons who are mentally retarded (Liberty, 1984). These have included marking tallies with pens-and-paper, coloring in squares on paper, pushing a computer button, marking a "+" (plus) or a "-" (minus), marking off squares on a form, and using some kind of mechanical counting device. In all cases, some

system is devised that is manageable for the individual in a specific setting.

The accuracy of self-monitoring has been addressed in some studies. In some cases accuracy has been low (Lipinski & Nelson, 1974), but in many other cases it has exceeded 85% (Horner & Brigham, 1979; Liberty, 1984). It has been suggested that self-monitoring accuracy need not be perfect for it to be effective (Liberty, 1984).

Self-Evaluation and Self-Consequation

Self-evaluation refers to an individual making some assessment or overall evaluation of some aspect of behavior. Self-evaluation implies a relatively subjective measure of behavior against some criterion (Gross & Drabman, 1982). Although self-evaluation is often discussed in relation to self-assessment and self-monitoring procedures, it is also clear that self-evaluation includes more than monitoring of behavior. That is, self-evaluation includes a comparison of one's behavior against some standard. In turn, such comparison must include a decision about the acceptability or unacceptability of that behavior (Gross & Drabman, 1982).

Research on self-evaluation suggests that its effects on behavior are greatest when combined with the

self-delivery of consequences (Rosenbaum & Drabman, 1979). While self-evaluation usually requires some kind of self-monitoring, its effects may maintain without additional consequences.

Self-consequation includes both self-reward and self-punishment procedures in self-management. Self-reward includes procedures for determining the criterion for delivery of a reinforcer and for the delivery of a reinforcer (Mahoney, 1976). Self-punishment is similar to self-reinforcement inasmuch as it includes self-consequation although it focuses on delivery of an unpleasant consequence upon the occurrence of unacceptable behavior (Kanfer & Karoly, 1982). Self-consequation, both self-reward (Thoresen & Mahoney, 1974) and self-punishment (Mahoney, 1974a) has been demonstrated as an effective strategy for behavior change.

A small number of studies have addressed self-evaluation and self-delivery of reinforcers with persons who are mentally retarded. These studies demonstrate that persons who are mentally retarded can evaluate some aspect of their own behavior and that self-evaluation and self-delivery of reinforcers can change behavior. Litrownik, Lecklitner, Cleary, and Franzini (1978) taught moderately retarded adolescents to self-evaluate and self-reinforce

their own academic performance. The Horner and Brigham (1979) study was successful in training students with mild mental retardation to self-determine reinforcers from a standard set by the experimenters. Students self-reinforced correctly and the target behavior (on-task performance) improved. Helland et al. (1976) taught moderately retarded adolescents and adults to self-determine whether or not to self-deliver a reinforcer for increased work rate and found this as effective as externally-provided reinforcers. Wheeler, Freagon, and Stern (1985) used a procedure including self-recording, self-evaluation, and self-reinforcement to teach a young woman with severe handicaps to decrease the amount of time getting to her classroom. The subject was trained to set a timer, then arrive at her classroom before the timer sounded. She then marked a "+" (plus) or a "-" (minus) on a chart. At the end of 5 days the subject could earn a backup reinforcer. The type and frequency of backup reinforcers used in these studies varied greatly.

Prearrangement of Stimulus Cues

Prearrangement of stimulus cues refers to responses for managing one's own behavior by establishing stimulus cues. Notable and successful examples of this approach in changing behavior include weight control (Penick, Filion,

Fox, & Stunkard, 1971) and smoking control (D. Shapiro, Tursky, Schwartz, & Schnidman, 1974). These studies manipulated the availability of stimulus conditions associated with the behavior in order to control it. These studies and others (Mahoney & Thoresen, 1974) demonstrate effectiveness in changing and maintaining behavior by altering the stimulus control conditions that are associated with the behaviors in question.

Prearrangement of stimulus cues or manipulation of antecedent events has been successfully employed by researchers to improve target behaviors with persons labeled as retarded. For example, Sowers et al. (1980) taught adults with moderate retardation to manage time using picture cues. This procedure involved teaching subjects to respond based on picture cues of clock faces prepared by staff members. Connis (1979) used a similar procedure to teach independent movement from task to task in an employment setting. The manipulation of antecedent events as a self-management tool emphasizes the stimulus control aspects of changing and maintaining behavior.

Prearrangement of Consequences

Prearrangement of consequences is an approach to self-management wherein specific consequences are arranged so

that the behavior in question always produces a given consequence. This can decrease a target behavior (e.g., use of Antabuse resulting in vomiting if alcohol is consumed) or to increase behavior by setting up reinforcers to follow the emission of that behavior (Mahoney & Thoresen, 1974). Prearranged consequences can include consequation delivered by the individual or by external agents by agreement with the individual. These methods and "contingency contracting" have changed behaviors successfully both in terms of increasing desirable behaviors and in decreasing undesirable behaviors (Thoresen & Mahoney, 1974).

This strategy for self-management is one that usually requires a great deal of verbal behavior and has not received attention in research studies with persons with mental retardation. However, procedural materials are available which describe contingency contracting approaches (Sulzer & Mayer, 1972).

Self-Instruction

Self-instruction strategies involve the use of self-verbalizing to promote behavior change in a certain way. Most often, self-instruction involves an individual talking to him- or herself and self-coaching of the desired

response in the situation (Gifford et al., 1984; Meichenbaum & Goodman, 1969). This procedure has been used successfully in many applications with children (e.g., Lovitt & Curtiss, 1969) and adults (Kanfer & Karoly, 1982).

Self-instruction procedures have been employed successfully with persons who are mentally retarded. Burgio, Whitman, and Johnson (1980) used self-instruction with mildly retarded children to decrease off-task behavior. The effects of self-instruction with mildly retarded children on math skills was investigated by Johnston, Whitman, and Johnson (1980). This study showed an increase in accuracy on math problems. Rusch, Morgan, Martin, and Riva (1984) show that self-instruction on the maintenance of vocational performance is a useful strategy. Self-instruction in this study involved question-asking, making a guiding statement, and making a self-reinforcing statement to increase production rates with adults labeled mentally retarded (Rusch et al., 1984).

Lesser use has been made of other procedures in the area of self-management. These procedures include self-determined criteria wherein the individual subjects set their own standards for acceptable performance (e.g., Felixbrod & O'Leary, 1974; Sagotsky, Patterson, & Lepper, 1978). Covert intervention strategies have also been used.

Such procedures involve management of adult behavior problems and include a wide range of techniques such as desensitization and implosion (Mahoney & Thoresen, 1974). These procedures have not been included in self-management research with persons who have handicaps.

The studies noted here, as well as others, suggest that the use of self-management procedures with persons who are retarded is a viable and promising area and that the procedures used can be adjusted to make easier the responses required for self-management. Self-management procedures have been shown to be useful in a variety of settings for increasing or decreasing a variety of behaviors. Furthermore, the use of self-management procedures can shift the onus of minute-to-minute performance management away from external agents to the individual. This is true whether the issue is gathering accurate data about performance (i.e., self-monitoring) or related to applying consequences differentially.

A number of the procedures for self-management described above have been used in vocational settings with persons with mental retardation. The following section describes this research.

Self-Management in Vocational Settings With Persons With Mental Retardation

This section reviews literature specifically related to the use of self-management practices in vocational settings with persons labeled mentally retarded. Consideration of these studies is organized by the techniques applied and includes self-monitoring, self-delivery of reinforcers, antecedent cue regulation, and self-instruction. Table 1 provides a summary of the studies in this section.

Review of the following studies and previously cited studies related to self-management with persons labeled mentally retarded suggests several common points in the use of self-management to promote independent work behaviors.

1. Self-management procedures can be used with a variety of behaviors to promote independence in work settings. A number of studies (e.g., Rosine & Martin, 1983; Sowers et al., 1980; Wacker & Berg, in press; Wehman, Schutz, Bates, Renziglia, & Karan, 1978) suggest the range of behaviors that can be positively affected by the use of self-management procedures. This point emphasizes the flexibility and utility of self-management procedures that can be tailored to individual needs, behaviors, and circumstances in vocational settings.

TABLE 1. Studies of Self-Management Procedures in Vocational Settings With Persons who are Mentally Retarded

Study	Number of Subjects	Level of Retardation	Target Behavior	S-M	S-E	S-O	S-I	ACR	Setting	Length	Results
Zohn & Bornstein (1980)	4	moderate	Production rate & quality	X	—	—	—	—	Workshop	6 weeks	Some increase in rate
Shafer & Brooke (1984)	1	mild	On-Time behavior	X	—	—	—	—	Job site	19 weeks	Increase in on-time behavior
Goyos et al. (1979)	2	moderate to mild	Interactions with coworkers	X	—	—	—	—	Workshop	10 weeks	Increase in interaction with coworkers when on-task
Liberty (1984) #1	1	severe	Vocational task	X	—	—	—	—	School	Not specified	Acquisition of self-monitoring response
Liberty (1984) #2	1	severe	Vocational task	X	—	—	—	—	School	Not specified	Apparent increase in rate
Rudrud et al. (1984)	16	moderate	Production rate	X	—	—	—	—	Workshop	7 weeks + 1 month follow-up	Apparent increase in rate
Wehman et al. (1978)	3	profound to mild	Production rate	X	X	X	—	—	Workshop	<4 weeks	Self-delivered reinforcer more effective for 2 subjects
Helland et al. (1976)	12	moderate to mild	Production rate	X	—	X	—	—	Workshop	<4 weeks	Self-delivered as effective as external reinforcer
Hanel & Martin (1980)	9	severe to mild	Production rate & quality	X	—	X	—	—	Workshop	12 weeks	Apparent increase in rate
McNally et al. (1984)	13	severe to mild	Production rate	X	—	X	—	—	Workshop	17 days	Apparent increase in rate
Coleman & Whitman (1984)	17	moderate to mild	Participation in exercise class	X	—	X	—	—	Workshop	15 weeks	Increase in participation
Horner et al. (1979)	1	severe	Production rate & quality	—	—	X	—	—	Workshop	23 weeks	Increase in rate
Srikameswaran & Martin (1984)	4	moderate to mild	Production rate & quality	X	X	X	—	—	Workshop	32 weeks	Self-delivered reinforcers more effective for 2 subjects
Rosime & Martin (1983)	3	moderate	Tongue splaying	X	—	X	—	—	Workshop	6 weeks	Decrease in tongue-splaying behavior
Gardner, Cole, et al. (1985)	2	moderate	Inappropriate verbal behavior	X	X	X	—	—	Workshop	11 weeks & 6 month follow-up	Decrease in disruptive behaviors
Gardner, Clees, et al. (1985)	1	moderate	Production rate & Inappropriate verbal behavior	X	X	X	—	—	Workshop	15 weeks & 1 year follow-up	Decrease in inappropriate verbal behavior
Sowers et al. (1980)	5	moderate	Time management	—	—	—	—	X	Job site	23 weeks	Increase in on-time behavior
Sowers et al. (1985)	4	moderate	Task rotation	—	—	—	—	X	Job site	11 weeks	Increase in independent task rotation
Berg & Wacker (1983)	1	severe	Vocational task completion	—	—	—	—	X	Job site	9 weeks	Increased task completion
Wacker & Berg (1983)	5	severe to moderate	Vocational task acquisition	—	—	—	—	X	Workshop	6 weeks	Successful task acquisition
Rusch et al. (1984)	2	moderate to mild	Production rate	—	—	—	X	—	Job site	11 weeks	Increase in rate
Crouch et al. (1984)	3	moderate to mild	Production rate	—	—	—	X	—	Workshop	20 weeks	Increase in rate for 2 subjects

Note. S-M = Self-Monitoring; S-E = Self-Evaluation; S-O = Self-Delivery of Positive Reinforcement; S-I = Self-Instruction; ACR = Antecedent Cue Regulation.

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2. Recording systems can be devised that are manageable for persons with mental retardation. Liberty (1984) points out the range of self-recording devices and systems that have been devised by researchers in order to transfer the control for recording to the individual. The ability to do so means that self-recording can be managed by persons with mental handicaps.

3. Self-monitoring data can be used as data sources. A number of studies (e.g., Liberty, 1984; Srikameswaran & Martin, 1984) indicate the accuracy of self-monitoring data recorded by persons labeled mentally retarded. This opens up the potential of data provided by the individual as a source of information related to ongoing performance.

4. Self-management procedures can reduce dependence on external supervisors. Several authors (including Helland et al., 1976; Horner et al., 1979; Shafer & Brooke, 1984; and Wehman et al., 1978) note that the use of self-management procedures has resulted in increased independence and decreased dependence on supervisor contact and intervention. This opens up a wide range of possibilities in the area of maintaining behavior without increasing supervisor roles. This factor, coupled with the accuracy of self-recording data, suggests that behavior can be maintained

while decreasing supervisor presence and providing accurate performance data.

Studies of Vocational Behavior Using Self-Monitoring Alone

Studies are described here that employed self-monitoring in isolation. While these studies tend to support the utility of self-monitoring as an agent of behavior change, issues remain related to the backup reinforcers provided and the long-term effects of self-monitoring alone.

Zohn and Bornstein (1980) taught 4 moderately retarded adults in a sheltered workshop to self-monitor the number of seven-piece hospital kits assembled using a pencil-and-paper system. The results indicate an increase in work productivity for 2 of 4 subjects and an increase in work quality for 3 subjects. Self-monitoring accuracy exceeded 97% for all subjects. Reinforcement procedures, if any, were not described.

Shafer and Brooke (1984) taught a woman with mild retardation to self-record her check-out time when leaving work. Using a reversal design, this study showed a significant improvement in checking-out on time. The subject self-recorded accurately (> 80%) during this 19-week study. Reportedly, the subject was consequated for inaccurate

recording and for checking-out early "every three or four days" during self-recording phases. No consequences were provided during baseline phases.

Goyos, Michael, and Martin (1979) taught 2 moderately retarded adults to self-monitor their delivery of attention to other persons with retardation in a sheltered workshop. Using a multiple-baseline design, the frequency of interactions during on-task behaviors increased. Those persons engaging in self-monitoring were socially reinforced "intermittently" for the target behavior of interacting with other workers when on-task.

Liberty (1984) conducted two studies related to self-monitoring with a student with severe retardation. The subject was taught to press a button on a counter for each unit completed using an avoidance training procedure. Work performance was reported to have maintained during self-monitoring phases. Reliability of self-monitoring was reported as high (although unspecified) without specific reinforcement for self-monitoring. A second study with the same subject on a separate task was conducted. Reportedly, the subject accurately self-monitored and production rate improved after instruction. Liberty (1984) also suggests that the highest production rates occurred on the same days as the most accurate self-monitoring.

Rudrud, Rice, Robertson, and Tolson (1984) conducted a study of the effects of self-monitoring with 16 adults with moderate retardation in a sheltered workshop. Subjects were taught to record a "+" (plus) or a "-" (minus) for whether or not they were working when a beep sounded from a tape recorder. The beeps occurred on a variable interval schedule ranging from 1.8 minutes to 15.0 minutes. Rudrud et al. (1984) report that increases in production rates that occurred in the presence of the recorded beeps generalized to other times of the day. Data on quality were not reported. Individual data were not reported nor was the nature of the ongoing feedback provided to subjects for the duration of the study.

The studies utilizing self-monitoring alone suggest some improvement in target behaviors. However, reinforcement contingencies provided by external agents were not clearly described in most studies. If reinforcement was provided related to the target behaviors (as it was in the Shafer & Brooke, 1984, study), then questions remain about the effects of this consequence. It is important to note that other studies using self-monitoring (such as Mahoney & Thoresen, 1974) suggest that self-monitoring alone may have only temporary effects. One possible explanation is that

all but one of the studies were of short durations (< 12 weeks).

Only one of the studies reviewed reported changes in work quality. Zohn and Bornstein (1980) reported that for 3 of 4 subjects, work quality increased with the intervention. The other studies focused on rate variables. The studies by Shafer and Brooke (1984) and Goyos et al. (1979) targeted behaviors where quality was not at issue.

Studies of Vocational Behavior Using Self-Delivered Reinforcers

Studies using self-delivered reinforcers show this strategy to be as effective as and, in some cases, more effective than externally-delivered reinforcers. Similar to the studies described using self-monitoring alone, rate has been the primary dependent variable with much less attention given to work quality. A point of variation in these studies is the extent to which backup reinforcers are managed by staff members.

Studies conducted by Wehman et al. (1978) investigated the comparative effects of external versus self-delivered reinforcers. With two subjects, self-delivered and self-determined reinforcers were more effective than externally-delivered reinforcers (coins with edibles as backup reinforcers) in increasing production rates. In

this study, multiple intervention effects could not be excluded since reinforcement phases were sequential (i.e., external, self-delivered, and self-determined). In another study, with an adult with profound retardation, external reinforcers were more effective. Changes in work quality were not reported.

Helland et al. (1976) compared external and self-reinforcement in a group design with 12 moderately and mildly retarded persons. Subjects in each group showed increases in production rates in a collating task which suggests that self-delivered reinforcers (coins or candy) were as effective as externally-delivered reinforcers.

Hanel and Martin (1980) used a self-management package including self-monitoring, self-delivery of tokens, and goal-setting to improve the production rates of 8 adults with severe to mild retardation who assembled airline coffee packs in a sheltered workshop. External supervision was held constant throughout the experiment. All subjects showed an increase in production rates. Work quality changes were variable with 3 subjects showing some improvement in work quality in self-management phases; the other 5 subjects showed some loss in work quality. In a reversal phase in this study, 5 of the 6 subjects showed no change in rate from the self-management phase.

McNally et al. (1984) utilized self-monitoring, self-delivered reinforcement, and performance feedback to increase the production rates of 13 adults in a sheltered workshop. Subjects, who were severely to mildly retarded, were taught to stack tokens to record units completed. Subjects received supervisor reinforcement for reaching a changing criterion. All subjects showed increases in productivity with the intervention and decreases in productivity during a return to baseline. Data on work quality were not reported. This study is difficult to interpret for several reasons. First, reliability measures were not collected. Second, the authors suggest that verbal praising by supervisors may have been greater during the intervention, although no data on this were provided. Third, the intervention phase lasted only 8 days. Fourth, no data on the accuracy of self-monitoring were reported.

A study by Coleman and Whitman (1984) investigated the effects of self-monitoring and self-reinforcement on participation in an exercise program in a sheltered workshop. The subjects were 17 adults with moderate to mild mental retardation. Attendance in the exercise class improved through use of self-monitoring and self-delivery of stickers for meeting a criterion. A choice of backup

reinforcers were delivered by supervisors weekly. Self-reward accuracy ranged from 72% to 90%.

Horner et al. (1979) taught an adult with severe retardation to self-deliver tokens for accurate work completion. Tokens were exchanged for edible reinforcers at the end of 90-minute work periods. The data indicate a substantial increase in production rate over the baseline phases when the tokens were delivered by staff members. Work quality remained high during the self-delivery phases. The authors suggest this may have been due to the fact that the quality control standards were easily discriminable for the task.

Srikameswaran and Martin (1984) compared self-monitoring, self-monitoring plus goal-setting and, self-delivery of tokens with 4 adults labeled moderately and mildly retarded in a sheltered workshop. During the self-monitoring conditions, subjects were taught to make a check mark in a square on a piece of paper after completing a unit of work on a packaging task. During the self-monitoring plus goal-setting, supervisors assisted subjects to set progressive goals for work rate. In the self-delivery of reinforcers condition, subjects self-delivered tokens backed-up by monetary or edible reinforcers. The results revealed that 2 subjects showed an increase in

productivity in the self-delivery phase; 1 subject showed maximum productivity during self-monitoring and 1 subject showed maximum productivity during a baseline phase and decreases in productivity in the self-delivery phase. Quality of work exceeded 90% for all subjects in all phases. Accuracy of self-monitoring was at least 85% for all subjects. Unlike other self-management studies with persons with mental handicaps, Srikameswaran and Martin (1984) also reported data on the ongoing contacts subjects received from supervisors.

Several studies have used self-management procedures to decrease undesirable behaviors in vocational settings. Rosine and Martin (1983) decreased tongue splaying in 3 persons with moderate retardation. Tokens were earned for low levels of occurrence of the target behavior. Generalization of low frequencies of the target behavior to other settings was reported to have occurred. Subjects self-monitored the target using a wrist counter. Access to backup reinforcers was managed by staff.

Gardner, Cole, Berry, and Nowinski (1983) used self-monitoring and self-consequation to reduce disruptive behavior with 2 moderately retarded adults in a sheltered workshop setting. Self-management training consisted of teaching subjects to discriminate between behaving

appropriately and behaving inappropriately while working. Subjects were taught to label their behaviors as "good adult work" or "not adult work" behavior. Subjects were trained to set a timer and record if their behaviors were acceptable. Coins were self-delivered for appropriate behavior. Reductions in the inappropriate target behaviors resulted. However, the authors indicated that subjects were prompted when needed during the study to perform the self-management responses. No data were provided regarding the independence of subjects in performing the self-management responses.

Gardner, Clees, and Cole (1983) investigated self-monitoring, self-consequation, and self-instruction to decrease inappropriate verbal behavior with a moderately retarded adult. The subject was trained to self-manage in a fashion similar to that in the Gardner, Cole, et al. (1983) study. As in the previous study, it is unclear how much of the described self-management procedure was managed by a supervisor. Increases in production rates reportedly occurred.

These studies which incorporate self-delivery of reinforcers into a self-management intervention package support the contention that self-delivered consequences can be as effective as externally-managed consequences in increasing

target behaviors and, in some cases, more effective. One study (Hanel & Martin, 1980) suggests that work quality decreased for some subjects during the self-management phase. What is not clear, from these studies, is the degree to which contingencies are managed by supervisors. In these studies significant backup reinforcers were delivered by supervisors.

Studies of Vocational Behavior Using Antecedent Cue Regulations

Several studies have approached self-management issues in vocational settings via manipulation of antecedent cues to increase the independence of persons with handicaps. This approach addresses the stimulus-control aspects of behavior change and maintenance, whereas the previous studies have dealt more with consequence issues.

Studies have used regulation of antecedent events, most often picture cues, to increase the independence of persons with mental retardation. Sowers et al. (1980) taught 3 adults with moderate retardation to time-manage successfully in a university-cafeteria job setting. Subjects, who were unable to tell time, were taught to use a picture cue of a clock to go to breaks and lunch on time. On-time behavior was improved.

Sowers, Verdi, Bourbeau, and Sheehan (1985) successfully taught 4 severely and moderately retarded young adults to independently go from job task to job task after instruction in using a changing sequence of picture cues.

Berg and Wacker (1983) used a picture-cue system to teach an adolescent with severe retardation to locate and empty wastebaskets independently. Wacker and Berg (1983) used a similar picture-prompt strategy to train complex assembly tasks. Picture prompts were reported to improve acquisition and generalization.

The studies utilizing regulation of antecedent cues focus on stimulus conditions in the performance environment rather than consequent events. These studies do, however, focus on strategies which also include participation by the subjects in managing the behaviors in question.

Studies of Vocational Behavior Using Self-Instruction

Another strategy in self-management for increasing independence of persons with severe handicaps has involved self-instruction. This strategy suggests that individuals can "coach" themselves through given behaviors. Unlike techniques related to antecedent event manipulations, this technique also includes verbal self-reinforcement for the successful completion of tasks.

A self-instruction strategy has been employed by some investigators to increase vocational independence with persons who are mentally retarded. Rusch et al. (1984) taught subjects to ask questions about the next tasks to be completed, answer their own questions, and self-instruct themselves through each task. Two adults with moderate mental retardation participated as a part of their jobs. The self-instruction procedure was shown to somewhat increase the percentage of intervals spent working.

Crouch, Rusch, and Karlan (1984) trained 3 persons with moderate retardation to self-instruct on when they would finish a particular task and to self-reinforce upon completion. This procedure increased work speed for 2 of the 3 subjects.

Conclusions and Summary

Conclusions

From a review of available literature a number of conclusions and issues can be noted which relate to the outcomes of the studies, the ways in which self-management research i conducted with persons who are mentally handicapped, and remaining needs for research in this area.

1. The focus of self-management techniques must be to develop strategies wherein the individual maintains or

extends desired behaviors. Numerous studies cited here suggest that the minute-to-minute management of behavior need not be controlled by external agents. Studies are needed to demonstrate that self-management procedures work in the absence of continuous supervisor presence and actually reduce the amount of supervisor time required. The successes with these strategies suggest their effectiveness in changing behavior, but what is needed is additional information on the use of self-management techniques to maintain behavior over time.

2. Self-management procedures with persons who are mentally retarded cannot be expected to erase all need for supervisor feedback. In most studies, some level of supervisor feedback was provided. To date, research has not shown that self-management procedures will make external feedback completely unnecessary. Some authors (Wehman et al., 1982) suggest that the level of supervision that is required to maintain performance may be related to the level of disability.

3. The effects of self-monitoring over time is not clear with persons who are mentally retarded. Even though studies suggest improvement in target behaviors using self-monitoring alone, it remains difficult to assume that this procedure alone is responsible for behavior change. Some

studies (Goyos et al., 1979; Shafer & Brooke, 1984; Zohn & Bornstein, 1980) seem to have provided social reinforcement for the target behaviors in question. This presents a confound in analyzing the effects of self-monitoring. Without a clear description of how reinforcement is provided it is difficult to assess the effects of self-monitoring. In addition, the use of self-monitoring alone, over extended periods of time, is lacking to show maintenance effects.

4. Studies using self-reinforcement have sometimes provided backup reinforcers making it difficult to assess the use of self-reinforcement separate from the effects of the reinforcers. Wehman et al. (1978), Helland et al. (1976), and Horner et al. (1979) provide some comparison of external versus self-delivered reinforcers. As a group, these studies suggest that self-delivered reinforcers can be effective but more information is needed related to the conditions of their use. In addition, data on supervisor input during self-management phases have not been available.

5. There is a basic difference between self-management procedures addressing antecedent events and those addressing consequent events. The use of picture cues and most self-instruction procedures are interventions

dealing primarily with stimulus conditions and antecedent events. These procedures are different from self-reinforcement or self-evaluation procedures. Although each type includes procedures that are manipulated by the individual and are appropriately labeled as self-management, there are important differences in how and why they affect behavior; the former provides consistent and clear stimulus conditions, the latter provides ongoing measurement and consequences for behavior.

6. Most self-management studies on vocational behavior with persons with retardation have been conducted in totally sheltered settings. Of the 22 studies summarized in Table 1, 17 were conducted in sheltered workshops or other segregated and sheltered settings. Of the remaining 5 studies conducted in more realistic job sites, 3 employed antecedent event self-management techniques, 1 used self-instruction techniques, and 1 addressed self-monitoring.

7. The effects over time of self-management strategies with persons who are mentally retarded are not established. Most of the reviewed self-management studies lasted less than 12 weeks. Studies in vocational settings are needed which address maintenance over longer periods of time; job success, by any definition, must extend to months

and years. In addition, the procedures developed must be ones that can be used over extended periods of time. Although a few studies have covered long periods, additional data are needed related to the maintenance of self-management responses and the maintenance of target behaviors in nonsegregated job settings.

8. More research is needed on self-management techniques that are conducted in job settings with procedures manageable in everyday integrated working situations. One strategy (Seymour & Stokes, 1976) that requires further investigation is related to teaching persons with mental handicaps to appropriately self-solicit reinforcement in natural work settings. Wacker and Berg (in press) point out that persons without handicaps will solicit feedback or praise from supervisors at appropriate times. Strategies are needed for teaching persons with mental handicaps to solicit feedback appropriately from supervisors.

9. Self-management interventions in vocational settings have most often addressed work rate rather than work quality. Presumably, quality standards have been part of the criteria in many studies. However, few of the studies which focused on work behaviors included data related to work quality in addition to rate data (Hanel & Martin, 1980; Horner et al., 1979; Srikameswaran & Martin,

1984; Zohn & Bornstein, 1980). Hanel and Martin (1980) suggested some loss in quality during self-management phases. Horner et al. (1979) noted extremely high quality during the self-delivery phases but suggest this may be due to the ease of discriminating quality on the task used in that study.

Summary

Three bodies of literature have been considered here: supported employment for persons with severe mental handicaps, the maintenance of behaviors over time, and the use of self-management procedures with persons who are mentally handicapped. It is clear that persons labeled severely and moderately retarded can learn and perform a wide variety of successful job behaviors. Efforts to maintain behaviors have focused on both antecedent events and external controls.

The use of self-management practices holds promise for extending the competencies of persons with mental retardation while addressing the needs present in integrated job settings where continuous supervisor presence is neither possible nor desirable. Self-management procedures with persons with mental retardation in the realm of vocational behavior have been conducted most often in sheltered and

segregated settings and similar efforts are needed in the type of job settings encountered by an increasing number of job placement and support programs across the country. A good basis has been developed for the use of self-management procedures with persons who are mentally retarded in realistic job settings. The present research effort is an attempt to provide additional data in this area.

Purpose of the Study

This study examined the effect of self-management procedures in minimally-restrictive and integrated job settings with young adults having severe and moderate mental retardation. The specific research questions addressed were:

1. Can persons with moderate and severe retardation learn self-monitoring procedures in integrated job settings?

2. Can persons with moderate and severe retardation learn self-monitoring procedures on multiple jobs?

3. Can persons with moderate and severe retardation maintain self-monitoring behaviors over a period of months?

4. Can persons with moderate and severe retardation accurately self-monitor over a period of months?

5. Is there a differential effect on work rate and work quality between self-monitoring and self-solicitation of feedback?

CHAPTER II

METHODOLOGY

Subjects

This study included 7 subjects, 5 males and 2 females. Subjects were students from five regular public high school programs for persons with severe handicaps. All subjects were between 18 and 20 years of age. The mean age of subjects was 19 years. Subjects' IQs ranged between 36 and 54 as measured by the WAIS-R, the WISC-R, or the Stanford-Binet. Table 2 presents characteristics of all subjects.

Subjects were selected for participation based on the following criteria: (a) placement in an integrated job setting as a part of each student's planned individual education program (IEP); (b) improved vocational ability as a goal on the student's IEP; (c) the expectation of school personnel that each student would continue in his or her job duties for the duration of the study; and (d) informed consent of the individual and the parents or legal guardians.

TABLE 2. Subject Characteristics

Subject	Age	Sex	IQ	Instrument
AG	18	M	<40	WISC-R
HS	19	M	36	Stanford-Binet
AK	19	F	40	WISC-R
AM	20	M	43	Stanford-Binet
IL	19	F	<40	WISC-R
LG	18	M	54	WAIS-R
UR	20	M	50	WAIS-R

All subjects had received vocational training and opportunity prior to the study. This included some prior experience and training on job tasks similar to those in the study. No subject was independent on the job tasks in the study prior to the beginning of the study. Subject IL was dropped in week 11 of the study due to the recurrence of behavior considered unacceptable to the manager of the restaurant.

Settings

The settings consisted of two restaurants in Eugene, Oregon, for all portions of the study. The first 6 subjects performed job tasks in a restaurant at the student

union building on the University of Oregon campus. This restaurant specializes in Italian food and operates with a cafeteria style. The Lane Education Service District had an agreement with the food services management at the student union which provided access to restaurant-related jobs for students with severe handicaps in this setting. This restaurant served approximately 200 meals a day at lunchtime. The seventh subject, UR, performed job tasks in a small restaurant located in downtown Eugene. This restaurant has a seating capacity of about 50 and provided breakfast and lunch service. These two settings were selected because they were real-world restaurants similar to those in which persons with severe handicaps may be employed.

Job Tasks

All of the job tasks trained to and performed by the subjects in the study were restaurant-related service tasks. The specific tasks were selected for two reasons: (a) the tasks were required for the operation of the restaurant and (b) subjects would have regular access to these tasks. Each of the first 6 subjects performed two job tasks. Subject UR performed one job task.

Pots and Pans

This task involved scrubbing pots, pans, and paraphernalia associated with preparing Italian food. Most of the items needing cleaning were pots and pans although such items as knives and ladles were also included.

Items were presoaked in a sink then sprayed with an industrial type sprayer to remove large food pieces from the surface of the item. Following this, items were scrubbed with an abrasive pad, wiped with a soft soapy cloth, and rinsed in two separate rinse sinks. The Pots and Pans area was located next to the kitchen.

Dishes

Washing dishes included removing major food pieces from plates, trays, cups, and silverware with a sprayer; the items were arranged in large trays that were pushed into an industrial dishwasher; each load was then automatically conveyed through the wash cycles. The dishwashing room was located downstairs, below the restaurant and kitchen, directly under the kitchen area.

Restock

The task of Restocking included unloading plates, trays, cups, and silverware from the large trays emerging

from the dishwasher. Items were arranged by type on a wheeled cart with two shelves. The cart was loaded until full or until the flow of dishes stopped from the dishwasher. At this point, the cart was pushed from the dish room to a service elevator next to the dish room and the elevator was taken to the floor immediately above. The restocker exited the elevator upstairs in the main kitchen area and maneuvered the cart to the cafeteria area where items were unloaded by type in the areas designated for each item. The restocker then returned to the dish room for another load via the service elevator.

Take Down

Since the restaurant was upstairs from the dish room, dishes and trays were transported from the main patron seating areas to the dishwashing room downstairs. This task included the use of a tall cart holding trays with dirty dishes. The tall wheeled cart was pushed to an elevator near the patron seating areas, taken downstairs via the elevator, and pushed into the dish room. The subject then left the dish room with an empty tall cart and took it upstairs via the elevator and returned it to the spot formerly occupied by the cart with dirty dishes.

Busing

This task was located in a separate eating area and included picking up trays, cups, plates, etc.; placing them on a hand-held tray; and walking with the tray to a conveyor. The tray was placed on a conveyor which transported the trays to a dish room. Paper trash was removed from the tray before putting it on the conveyor. This task also included unloading trays of items from tall carts located around the eating areas and placing them on the conveyor.

Dishes--Subject UR

The job task for Subject UR involved washing dishes in the downtown restaurant. This task included picking up a bin full of dirty dishes from the restaurant busing area, carrying it to the dishwashing area, loading a small industrial dishwasher, adding soap and turning on the dishwasher, unloading the dishwasher, and returning clean items to the appropriate locations for future use.

Time Standards

Time standards (i.e., the rate at which an average nonhandicapped employee performs the task) for each job task are presented in Table 3. The time standards were

established following Department of Labor guidelines by having persons without handicaps engage in these tasks on at least three separate occasions and averaging their work rates.

TABLE 3. Task Time Standards

Task	Time Standard
Pots and Pans[a]	0.99 per minute (1 unit = 1 pot)
Dishes[a]	0.55 per minute (1 unit = 1 load of dishes)
Restock[a]	0.16 per minute (1 unit = 1 trip)
Take Down[a]	0.20 per minute (1 unit = 1 trip)
Busing[a]	2.12 per minute (1 unit = 1 tray of bused dishes)
Dishes[b]	0.25 per minute (1 unit = 1 load of dishes)

[a]Task in University restaurant; Subjects AG, HS, AK, AM, IL, and UR.

[b]Task in downtown restaurant; Subject UR.

Subjects and Task Schedules

Subjects performed each task for 30 minutes or more each working day. Subject UR performed dishwashing for about 2 hours each working day. The time of day that each subject performed tasks and the duration of time on-task was constant throughout the study with only minor variations.

The task assignments for each subject were as follows: Subject AG, Dishes and Pots and Pans; Subject HS, Pots and Pans and Restock; Subject AK, Pots and Pans and Take Down; Subject AM, Busing and Restock; Subject LG, Dishes and Pots and Pans; Subject UR, Dishes only.

Trainers and Data Collectors

Five persons conducted the training and collected data during the study. Two were undergraduate students, one was a graduate student, and two were not students at the University of Oregon. All had previous direct-service experience with persons with mental handicaps.

Trainers and data collectors received in-service training from the principal investigator who demonstrated standard teaching techniques (Bellamy et al., 1979) to be used during the task acquisition phases of the study. After demonstrations for each person, trainers were asked to perform the procedures and received feedback. This training was discontinued when the trainer demonstrated the appropriate training procedures at 100% accuracy during two training sessions. Thereafter each person was observed at least weekly with feedback provided by the principal investigator.

Data collection procedures were taught in the same way using modeling and feedback. Reliability and observer agreement measures are described in a later section of this chapter.

Measurement

The dependent variables within the study were: the rate of acquisition of job tasks and self-management responses, the rate at which subjects worked on assigned tasks, the quality of work performed, the accuracy of self-management responses, and the frequency and duration of contacts by supervisors present in the job settings (not trainers or data collectors in the study).

Job Task and Self-Management Response Acquisition

Two measures were used to assess acquisition of job tasks and self-management responses. These were the amount of instruction and the number of trials to criterion. These measures were collected by trainers who (a) recorded the start time and stop time of each training session on a training data form and (b) recorded the number of trials per session by counting and recording the number of units completed on the training data form.

Work Rate and Productivity

This dependent variable was used to assess the rate at which subjects performed the targeted tasks. The rate of work completion was assessed in two ways. First, performance was converted to a rate per minute for each task. This was accomplished by dividing the number of units of work completed for each task by the number of minutes spent working on the task for that work period. Second, work rate was converted to percentage norm standard. This was accomplished by dividing the actual observed work rate of subjects by the work rate from the established time standard, producing a percentage norm standard or percentage productivity.

These data were collected by the trainers and data collectors by (a) recording the start time and stop time for each session on a data collection form and (b) counting and recording the number of units of work completed during the session. These data were then converted to work rate and productivity values.

Work Quality

A measure of the quality or accuracy of the work performed by subjects was collected in addition to measures of the rate at which the work was performed. Acceptable

standards for work quality were established by the restaurant supervisors for each task. These standards were used by the data collectors to evaluate the quality of each unit of work completed for each subject during each session. Data collectors counted and recorded the number of units of work correctly completed in addition to the total number of units completed. These data were recorded on the same data collection form as the data related to work rate. To assess work quality, the total number of units of work for each task completed to acceptable quality standards was divided by the total number of units of work completed. This yielded a percentage quality for each person on each task during each work session.

Accuracy of Self-Management Responses

Subjects received training on recording the number of units of work completed and the amount of time spent working on each task each day. The accuracy of each subject's self-recording was assessed by observing and recording the number of units of work completed and comparing that to the values recorded by each subject on each targeted task on each day. After subjects had recorded the number of units completed and the number of minutes spent working and proceeded to the next task, the data collector would locate

the subject's wire-bound notebook to check and record the numbers the subject had recorded. These data yielded a percentage accuracy of these responses by dividing the subject-recorded totals by the observed totals completed.

Supervisor Contacts

In addition to trainers and data collectors who were part of the study, there were supervisors and other personnel normally present in each restaurant setting. These supervisors were those responsible for making sure that the flow of work was maintained throughout the working day. The frequency of contacts and duration of contacts by these persons were observed and recorded by data collectors for all tasks during all phases following the task acquisition phases. These data were collected to document the amount of input received by subjects during tasks targeted in the study.

Reliability

Observer agreement consisted of independent observations bv a second person. Agreement data were collected on 10% of the data points for each subject on each task during each phase of the study. The measures included were productivity, work quality, accuracy of self-management

responses, and supervisor contacts. Observer agreement was calculated by dividing the number of agreements by both observers by the total number of agreements and disagreements. Cohen's Kappa (Hollenbeck, 1978) was also computed on these measures.

Reliability measures on work rate and work quality were collected on 10.43% of all data points including at least 10% of the data points in each phase for each subject. Observer agreement ranged from 83% to 100% with an average observer agreement of 97.6%. Kappa was computed at .7986. Observer agreement on the number of minutes working was 100%. Observer agreement on the accuracy of subject Self-Monitoring was 100%.

Reliability measures on supervisor contacts were collected on 9.9% of all data points. Observer agreement averaged 97.19% with a range of 50% to 100%. Kappa on the number of contacts was .8985. On the duration of supervisor contacts Kappa was .9025. Observer agreement on duration of contacts was 93.05% with a range of 50% to 100%.

Procedures

Design

The study employed a single-subject, multiple-baseline design across behaviors. This design is a variation on

conventional multiple-baseline designs for comparison of two or more interventions (Hersen & Barlow, 1976). The design was used to compare working without Self-Monitoring, working with Self-Monitoring, and working with Self-Monitoring and Self-Solicitation of feedback. The phases of the study varied for each subject. Subjects were randomly assigned to the initial condition of training with Self-Monitoring versus training without Self-Monitoring. Subjects AG, HS, and AK received Task Training along with Self-Monitoring Training followed by a phase with Self-Monitoring Only. This phase was followed by the introduction of the Self-Solicitation of Feedback Phase for Subjects AG and AK on two tasks and Subject AK on one task.

Subject AM received the following sequence of phases: Task Training Phase (without Self-Monitoring), Production Phase, and Self-Solicitation of Feedback Phase (Busing task only). Subject LG received the same sequence with the Self-Solicitation Phase staggered across the two work behaviors and with Reversal Phases on the task of Dishes.

For Subject UR, the phases were as follows: Task Training Phase, Production Phase, Self-Solicitation of Feedback Phase, return to Production Phase, and the reintroduction of the Self-Solicitation Phase.

In addition, an intervention related to work quality on one task (Pots and Pans) was introduced in a multiple-baseline fashion across subjects for Subjects AK, HS, AG, and LG. This intervention was added to address emerging error patterns which appeared to be idiosyncratic to the task of Pots and Pans.

The design for Subjects AG, HS, and AK allows comparison of the phases of Self-Monitoring Only compared to Self-Monitoring with Self-Solicitation of Feedback. The design for Subjects AM, LG, and UR allows comparison of working without Self-Monitoring compared to working with Self-Monitoring and Self-Solicitation of Feedback. Each phase is described below in more detail.

Task Training With Self-Monitoring Training Phase (Subjects AG, HS, and AK)

During this initial phase for these subjects, training was conducted to teach independent performance on each assigned task. In addition, subjects were trained to self-monitor the number of units of work completed and the amount of time spent working on each of the two tasks each day.

Training on job tasks was conducted using standard teaching techniques (Bellamy et al., 1979) which included the use of modeling, verbal prompts, physical prompts, and contingent social feedback to build independent performance.

Prior to the onset of training, each task was analyzed by the trainer in conjunction with the principal investigator. Training was conducted daily with data collected related to the independent initiation of each step of task.

Training of Self-Monitoring responses was also conducted during this phase and occurred as a part of Task Training. A unit of work was determined for each task (e.g., one pot washed equaled one unit completed, one Restock trip equaled one unit of work completed). Subjects were given counting devices (SportCraft counters) to count units and stopwatches (Innovative Time Corporation, Model L331B) to log the amount of time spent working. At the beginning of each work period on a targeted task, the subject was instructed to get his or her file box (23 cm × 13.5 cm × 11 cm) which contained a stopwatch, a counting device, and a small wire-bound notebook. The subject would then remove the stopwatch and the counter. After checking that the stopwatch was set at zero (or resetting it if needed), the subject started the stopwatch by depressing the start button. The stopwatch was left in a staging area nearby. Each subject was trained to check that the counter was reset to zero and to reset it to zero if needed. The counter was actuated by pressing a button which increased the display by one unit. The Self-Monitoring behaviors

were trained as a part of the total task for subjects in this phase. The resetting of the stopwatch and counter were trained as the first steps in preparing to begin the assigned task. The counting devices were small enough to fit in the pocket of aprons worn by employees in the restaurant. During task performance the subject was instructed to actuate the counter once for the successful and accurate completion of one unit of work as defined for that task. Use of the counter was taught as part of the training sequence.

When a work period ended, subjects returned to the staging area, pressed the button to stop the stopwatch and recorded the number of minutes worked (from the stopwatch) and the number of units completed (from the counter) in their notebooks. Subjects were independent at stopping work on a task by observing clocks in or near each work area. The stopwatch and the counter were each reset to zero and returned, with the notebook, to that subject's file box. During this phase, subjects received verbal praise for accurate work and for using the stopwatch and counter. No feedback was provided related to the number of units completed.

The procedures for using the stopwatch was modified for Subjects AG and LG when they did dishwashing. The

modified procedures were required in response to the variability in the flow of available dirty dishes. About three times a week, subjects would experience 3- to 10-minute periods when no dirty dishes were available. During these waiting periods subjects AG and LG were taught to stop the stopwatch until dirty dishes arrived in the dish room. When the person engaged in the Take Down task arrived with a cart of dirty dishes, the subject would press the start button on the stopwatch.

Figure 1 shows the form for recording the amount of time worked and the number of units completed. Training occurred daily until a subject demonstrated 90% accuracy on the job task and on the Self-Monitoring responses for both of the assigned tasks for 2 consecutive days.

(student) (task)

	Monday (date)	Tuesday (date)	Wednesday (date)	Thursday (date)	Friday (date)
Time					
#					

FIGURE 1. Recording format for self-monitoring.

Task Training Only Phase (Subjects AM, LG, and UR)

During the initial training phase for Subjects AM, LG, and UR, instruction was provided on the relevant tasks using procedures identical to those for subjects receiving Task Training with Self-Monitoring with the exception that Self-Monitoring devices were not provided and Self-Monitoring training was not included. Training in this phase was conducted daily until the subject demonstrated at least 90% accuracy for 2 consecutive days on both tasks.

Self-Monitoring Only Phase (Subjects AG, HS, and AK)

During this phase, subjects performed their tasks and monitored their work rates without prompts or feedback from trainers or data collectors. The restaurant supervisors delivered their usual contacts with the subjects. These supervisors were aware that these subjects were a part of a study on self-management but had no knowledge about the phases of the study or the hypothesis for each phase. Data collectors recorded data on start and stop times, number of units completed, work quality, accuracy of Self-Monitoring responses, and the frequency of supervisor contacts. No information or feedback was provided to subjects in this phase related to the behaviors of Self-Monitoring unless

Self-Monitoring accuracy fell to less than 80% for 2 consecutive days. If this occurred, trainers intervened on the following day to provide a brief booster training session. This procedure was employed for all subjects in subsequent phases requiring Self-Monitoring.

Production Phase (Subjects AM, LG, and UR)

During the Production Phase, subjects performed the trained tasks without feedback from the data collectors or trainers. Data collectors observed in an unobtrusive manner recording data related to productivity, work quality, and supervisor contacts.

Self-Solicitation of Feedback Phase

During the Self-Solicitation of Feedback Phase, Subjects AG, HS, and AK were taught to use their Self-Monitoring data to obtain feedback about their work. A criterion was set for an acceptable work rate for each person for each task based on judgment from the supervisors and the norm standards typical for individuals who work on these tasks.

The criterion levels established on each task for each subject entering the Self-Solicitation of Feedback Phase are presented in Table 4. These criteria are presented in

terms of units per minute and in terms of percentage productivity.

TABLE 4. Criteria for Subjects Entering Self-Solicitation Phase on Tasks

Subject	Task	Criterion Rate (Units per Minute)	% of Typical Productivity
AG	Pots and Pans	.35	35
	Dishes	.40	73
AK	Pots and Pans	.40	40
AM	Busing	1.50	67[a]
		.80	36[b]
LG	Pots and Pans	.40	40
	Dishes	.35	63[c]
		.40	73[d]
UR	Dishes	.17	68

[a]For the first 8 days of Self-Solicitation (S-S) Phase.

[b]For the remainder of S-S Phase.

[c]For the first S-S Phase.

[d]For the second S-S Phase, $S\text{-}S_2$.

A conversion chart was then constructed for each subject so that he or she could determine if his or her production rate met the criterion set for "doing well" (see Figure 2). These charts were constructed with minutes across the horizontal axis and the number of units completed on the vertical axis. Subjects were trained to

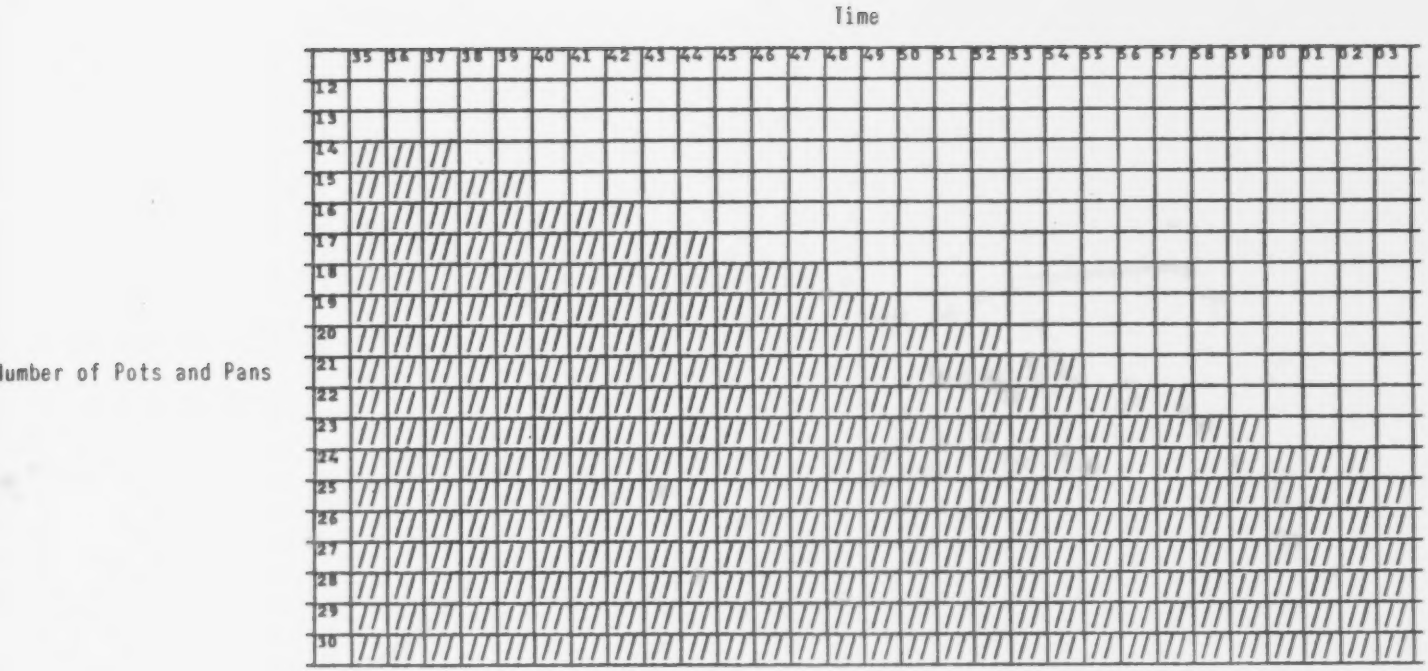

FIGURE 2. Conversion chart.

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use a plastic L-shaped ruler (C-Thru Ruler, Model L-808) to determine if their work rate was acceptable. The subjects were trained to find the number of minutes worked and recorded in the wire-bound notebook and match this number with the correct number on the horizontal axis of the conversion chart. The ruler was moved to a position adjacent to the number. The subject then moved the ruler's horizontal edge down just past the number representing units completed. The box in the lower right corner of the L-shaped ruler would then represent the rate of work completed. The lower areas of the conversion chart were shaded to indicate the acceptable work rate for the number of minutes worked. For example, if a subject working on the task of Pots and Pans worked for 42 minutes and completed 18 units, the conversion chart (Figure 2) was used as follows. The upright edge of the L-shaped rule was moved across the chart horizontally just past the number 42. Then the subject moved the horizontal edge of the ruler down, adjacent to the number 18 on the vertical axis. The square in the lower-right corner of the L-shaped ruler fell in the shaded area of the chart. After locating the area on the conversion chart representing their work rates, the subjects would determine whether or not their work rates fell in the shaded areas or the unshaded areas of the

chart. Subjects were trained to record a "+" (plus) on the bottom row for that day in the wire-bound notebook (see Figure 1) for that task indicating that they had worked fast enough. A "-" (minus) was recorded if the work rate fell in the unshaded portion of the conversion chart. The subject would then put away the counter and stopwatch and approach the trainer with the book showing a "+" or a "-" for that task. If the subject presented a plus, the trainer would praise the subject by saying he or she had worked well today and had worked fast enough. If the subject presented a minus, the trainer would respond with comments about the subject needing to work faster in order to get a plus. The time taken to deliver this feedback was approximately 60 to 90 seconds per day. The subject then returned the wire-bound notebook to his or her file box and went on to the next assigned job task.

Subjects AM, LG, and UR had not been trained previously on the Self-Monitoring responses. Therefore, for these subjects, training occurred on the use of the stopwatch and counter prior to data collection in this phase.

The procedures for Self-Solicitation were modified for Subject AM and Subject UR. The preassessment of numerical skills showed that Subjects AM and UR did not reliably match and record numbers. These subjects were given an

electronic timer (Sunbeam electronic kitchen timer) rather than a sopwatch. These subjects were trained to set the timer to a specified number of minutes at the beginning of each work period. They then used the counter as did all other subjects. The criterion in terms of the number of units to be completed was constant because the exact number of minutes to be worked was also constant. The counter was then modified to indicate when the criterion was reached (i.e., all of the numbers on the counter were green). At the end of the specified period of time a beeper sounded, indicating that the work period was over. Subjects AM and UR used the same procedure for recording a "+" or a "-" in their notebook, if the criteria had been met or not, and for presenting the information to the trainer.

Subjects were trained to solicit feedback in this phase from the trainers in the study rather than from the restaurant supervisors in order to ensure that the supervisors would not be informed of the specifics of the phases of the study for each subject and in order to reduce the likelihood of affecting the rate of supervisor contacts with each subject during task performance.

Production$_2$ Phase (Subjects LG and UR)

This phase replicated procedures in the first Production Phase. Subjects did not have access to the counter, the timing device, the conversion chart, or the self-recording notebook. Subjects in this phase received no feedback other than usual contact from restaurant personnel and supervisors. At the onset of this phase, subjects were informed that the devices, etc., would no longer be needed.

Quality Training Phase (Subjects AK, HS, AG, and LG)

The Quality Training Phase was introduced in response to increasing error rates for those subjects performing the Pots and Pans task. The task was redesigned to incorporate a redundant cue for a work-quality check on each unit completed. Training consisted of two sessions for each subject.

Self-Solicitation of Feedback$_2$ Phase (Subjects LG and UR)

This phase replicated the procedures for the first Self-Solicitation Phase for Subjects LG and UR. Subjects were informed that the devices, etc., were to be used again.

CHAPTER III

RESULTS

Results are presented for (a) task acquisition, (b) performance during posttraining phases, (c) effects of the self-management package, (d) self-monitoring accuracy, (e) frequency of supervisor contacts, and (f) task performance errors. These results provide information related to the specific research questions of the study on Self-Monitoring and Self-Solicitation of Feedback.

Task Acquisition

Table 5 presents the trials to criterion and hours of training to criterion for each task for each subject. Variability occurred across students and across tasks. Those students trained to wash Pots and Pans, for example, ranged from 128 trials (11.33 hours) to 596 (25.77 hours) to reach the Training criterion. This level of variability precludes any clear effect of the inclusion of the Self-Monitoring Training on the rate of acquisition. Of the 2 subjects who learned to Restock, Subject HS, who also learned to Self-Monitor, required over 5 times the number

of trials to reach criterion as Subject AM on the same task. Of the subjects who learned to wash Dishes, Subject AG, who also learned to Self-Monitor, required more than 3.0 times the number of training trials (1.5 to 4.0 times the hours of training) than Subject LG who learned the task without Self-Monitoring. The 2 subjects who learned to wash Pots and Pans and Self-Monitor required fewer training trials and training hours to reach criterion than Subject LG who learned the Pots and Pans task alone.

TABLE 5. Number of Trials and Hours to Criterion During Training

Subject	Task	Training Condition	Trials	Time (in hours)
AG	Pots and Pans	with	299	17.63
	Dishes	self-monitoring	876	40.38
HS	Pots and Pans	with	503	37.30
	Restock	self-monitoring	92	17.57
AK	Pots and Pans	with	128	11.33
	Take Down	self-monitoring	125	20.75
AM	Busing	without	453	7.97
	Restock	self-monitoring	17	5.75
LG	Pots and Pans	without	596	25.77
	Dishes	self-monitoring	129	9.58
UR	Dishes	without self-monitoring	260	26.50

Maintaining Work Rate

The present research focused on maintenance of work rate after Training. Figure 3 presents the percentage productivity for all subjects on all tasks across Training, Production, Self-Monitoring, and Self-Solicitation Phases. At the end of Training, subjects were performing tasks between 20% productivity (for HS on Pots and Pans) and 80% productivity (for AG on Dishes). The productivity levels were variable across subjects who performed the same tasks such as 40% (for AM) to 80% (for HS) on Restock. Variability was also apparent within individual subjects across tasks such as Subject AG who completed Training at 40% productivity on Pots and Pans and at 80% productivity on Dishes. Subject HS also performed with variability across tasks, working at 25% productivity on Pots and Pans and 75% productivity on Restock at the end of the Training Phase. Subjects showed increasing trends in productivity during the Training Phase with the exception of Subjects AG, AK, and HS on Pots and Pans, and Subject AM on Busing.

After reaching the Training criterion, 3 subjects entered the Production Phase and 3 entered the Self-Monitoring Phase. Under each condition some work rates maintained and some deteriorated. For subjects entering the Production Phase, 2 subjects showed losses in

productivity and 1 did not. Subject AM entered the Production Phase with Training levels of 42% productivity on Busing and 44% productivity on Restock for the last 4 days of Training. During the 24 days of Production that Subject AM spent on the Busing task, productivity averaged 51% with an across-phase trend of -.0012. During the 56 days of Production on Restock, productivity increased from 48% for the first 4 days to 51% for the last 4 days of the phase with a within-phase trend of +.0013. Table 6 displays the mean productivity for each subject for each phase. Table 7 displays the within-phase trends for each subject for each phase.

Although Subject AM generally maintained the Training levels of productivity across both tasks, Subject LG in the same condition did not. During Training, Subject LG's productivity on Dishes was 52% for the last 4 days of the Training Phase. During the first 4 days of the Production Phase on Dishes, productivity was 54% compared to 26% for the last 4 days. The within-phase trend during Production was -.0123. On Pots and Pans, Subject LG met criterion in Training with productivity of 52%. Productivity during the first 4 days in the Production Phase was 38% with 35% productivity in the last 4 days of the phase. The within-phase trend during Production on Pots and Pans was -.0037

TABLE 6. Mean Productivity

Subject	Task	Phase	Mean Productivity Within Phase
AG	Pots and Pans	Training with S-M[a]	.296
		S-M only	.229
		S-S[b]	.453
		S-S'[c]	.524
	Dishes	Training with S-M	.715
		S-M only	.628
		S-S	.816
HS	Restock	Training with S-M	.553
		S-M only	.647
	Pots and Pans	Training with S-M	.231
		S-M only	.450
		S-M'[d]	.462
AK	Take Down	Training with S-M	.502
		S-M only	.646
	Pots and Pans	Training with S-M	.197
		S-M only	.469
		S-M'	.371
		S-S'	.522
AM	Busing	Training without S-M	.440
		Production	.506
		S-S	.405
	Restock	Training without S-M	.338
		Production	.509
LG	Dishes	Training without S-M	.423
		$Production_1$	.505
		$S\text{-}S_1$	.507
		$Production_2$	.653
		$S\text{-}S_2$	.880
	Pots and Pans	Training without S-M	.387
		Production	.481
		S-S	.711
		S-S'	.584
UR	Dishes	Training without S-M	.627
		$Production_1$	.527
		$S\text{-}S_1$	.720
		$Production_2$	.685
		$S\text{-}S_2$	.689

[a]S-M = Self-Monitoring. [b]S-S = Self-Solicitation.
[c]S-S' = Self-Solicitation after Retraining.
[d]S-M' = Self-Monitoring after Retraining.

TABLE 7. Trends in Productivity Within Phases

Subject	Task	Phase	Within Phase Slope (Trend)
AG	Pots and Pans	Training with S-M[a]	+.0007
		S-M only	-.0042
		S-S[b]	-.0080
		S-S'[c]	+.0331
	Dishes	Training with S-M	+.0076
		S-M only	-.0269
		S-S	-.0022
HS	Restock	Training with S-M	+.0080
		S-M only	+.0002
	Pots and Pans	Training with S-M	+.0001
		S-M only	+.0028
		S-M'[d]	+.0052
AK	Take Down	Training with S-M	+.0079
		S-M only	+.0056
	Pots and Pans	Training with S-M	+.0007
		S-M only	+.0059
		S-M'	-.0636
		S-S'	+.0036
AM	Busing	Training without S-M	-.0049
		Production	-.0012
		S-S	-.0023
	Restock	Training without S-M	+.0273
		Production	-.0013
LG	Dishes	Training without S-M	+.0085
		$Production_1$	-.0123
		$S\text{-}S_1$	+.0467
		$Production_2$	-.0130
		$S\text{-}S_2$	-.0164
	Pots and Pans	Training without S-M	+.0116
		Production	-.0037
		S-S	+.0023
		S-S'	-.0068
UR	Dishes	Training without S-M	+.1015
		$Production_1$	-.0013
		$S\text{-}S_1$	+.0076
		$Production_2$	-.0307
		$S\text{-}S_2$	-.0043

[a] S-M = Self-Monitoring. [b] S-S = Self-Solicitation.
[c] S-S' = Self-Solicitation after Retraining.
[d] S-M' = Self-Monitoring after Retraining.

with a steep downward trend in productivity from the middle to the end of the phase.

Subject UR, who also entered the Production Phase, failed to maintain productivity at the level established during Training. Subject UR completed Training with 73% productivity across the last 4 days of Training. There was an immediate drop in level to 60% productivity for the first 4 days of the Production Phase to 48% at the end of this phase. The within-phase trend was -.0013.

For subjects entering the Self-Monitoring Phase, 1 subject (AG) showed immediate drops in productivity and 2 subjects (HS and AK) did not show a loss in productivity. Subject AG met the Training criterion on Dishes with an average of 86% productivity in the last 4 days in the phase. During the first 4 days of Self-Monitoring productivity was 74%. Productivity during the last 4 days of the phase was 56% with a decreasing within-phase trend of -.0269. On Pots and Pans, Subject AG met the Training criterion with 35% productivity. The mean productivity during the Self-Monitoring Phase was 23% with a trend of -.0042.

Subjects HS and AK entered the Self-Monitoring Phase and demonstrated increasing trends during the phase. Subject HS completed Training at 23% productivity.

Productivity at the end of the Self-Monitoring Phase was 58% for the last 4 days. The within-phase trend was +.0028. On the Restocking task, Subject HS completed Training at 67% productivity. During the Self-Monitoring Phase of 54 days, the mean productivity was 64% with a slightly increasing trend within the phase of +.0002.

Subject AK ended the Training Phase on Pots and Pans with 24% productivity. During the Self-Monitoring Only Phase of 44 days, productivity was 47%. The within-phase trend was +.0059. On the Take Down task, productivity at the conclusion of Training was 59%. This subject demonstrated a drop in productivity during the first 4 days of the Self-Monitoring Phase to 41%. However, by the end of the 76 days of Self-Monitoring, productivity was 72% with a trend of +.0056.

Self-Solicitation of Feedback

On at least one task, 5 subjects entered the intervention phase of Self-Solicitation of Feedback; 3 of these 5 subjects (Subjects AG, LG, and UR) entered this phase after demonstrating a decrease in trend or level (i.e., poor maintenance) during the Production Phase (Subjects LG and UR) or the Self-Monitoring Only Phase (Subject AG). Figure 4 presents the percentage productivity for these

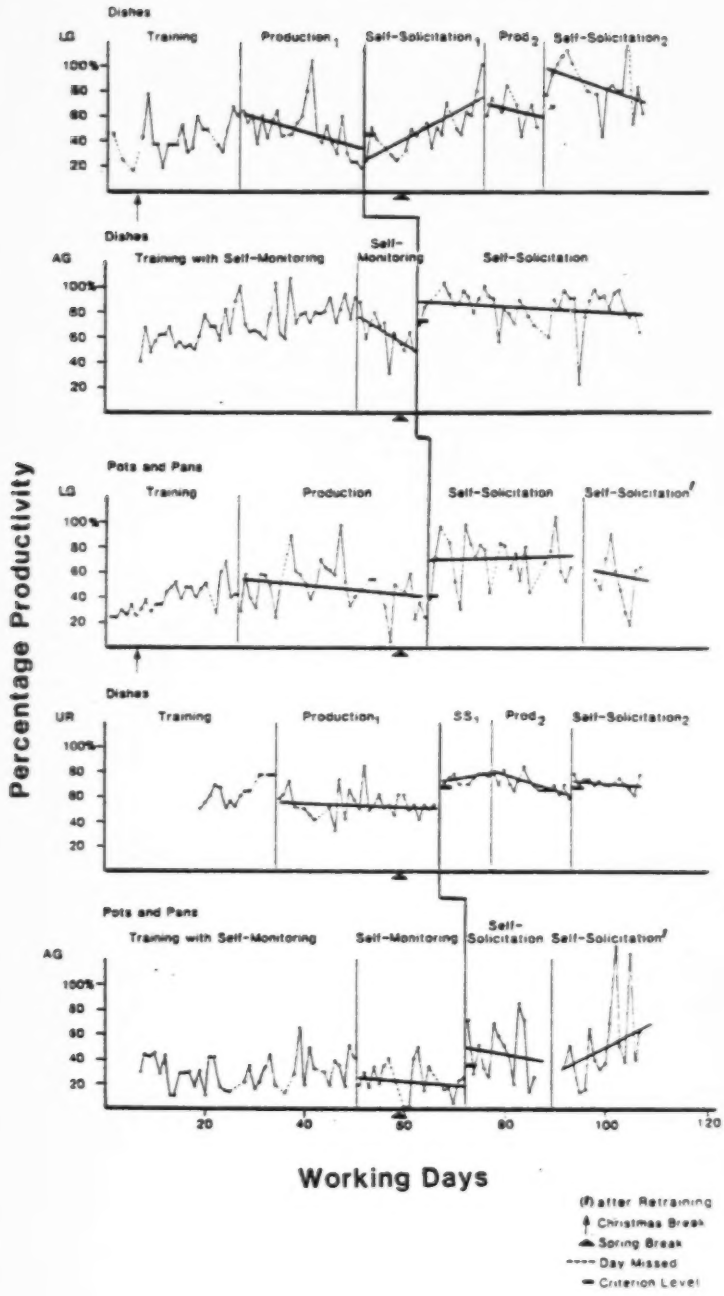

FIGURE 4. Productivity on work tasks for subjects entering self-solicitation phase with performance losses.

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subjects across phases on these five series (3 subjects) with computed trend lines included.

The Self-Solicitation intervention was introduced in a multiple-baseline format across the five series of tasks (for 3 subjects) where maintenance failures were evident. The Self-Solicitation intervention resulted in immediate and durable performance gains. In all five cases, the intervention maintained behavior above the criterion level with an average of 84% of days worked. The range was 62% to 91%.

Subject LG entered this phase first. On the task of Pots and Pans, Subject LG demonstrated an increase in productivity during the Self-Solicitation Phase. Mean productivity during the Production Phase was 48% with a downward trend of -.0037. Mean productivity in the Self-Solicitation Phase was 71% with a trend of +.0023. On Dishes, Subject LG performed with a mean productivity during Production of 50% and a trend of -.0123. Mean productivity during the first Self-Solicitation Phase was 50% with an upward trend of +.0467.

Subject AG demonstrated a downward trend of -.0269 on Dishes during the Self-Monitoring Only Phase with a mean productivity of 63%. Mean productivity during the Self-Solicitation Phase was 82% with a within-phase trend of

-.0022. On Pots and Pans mean productivity during Self-Monitoring Only for Subject AG was 30%. During the Self-Solicitation Phase, mean productivity was 49% with a within-phase trend of -.0080.

Subject UR demonstrated a shift in level of performance after the Task Training Phase. Mean productivity in the Production Phase was 53%. The within-phase trend was -.0013. During the first Self-Solicitation Phase, mean productivity was 72% with a within-phase trend of +.0076.

The effect of the Self-Solicitation intervention was assessed across both subjects and tasks in a multiple-baseline and within individual series for Subjects LG and UR on the task of Dishes. For Subject LG the Self-Solicitation Phase was withdrawn after 20 days and a reversal to Production Phase conditions was instituted. Subject LG demonstrated an immediate drop in level of performance from the last data points in the Self-Solicitation$_1$ and a reversal in the trend of performance. Mean productivity during the Production$_2$ Phase was 65% with a trend of -.0130. During the Self-Solicitation$_2$ Phase, mean productivity increased to 88% with an initial improvement in trend over the first 6 days of the phase, followed by lower, variable performance in the following days. The trend within this phase was -.0164.

Subject UR entered the Production$_2$ Phase after 9 days in the Self-Solicitation$_1$ conditions. During the Production$_2$ Phase Subject UR's mean productivity was 69% with a clear downward trend of -.0307. Subject UR ended the Production$_2$ Phase with 8 days of stable performance averaging 64% productivity. During the Self-Solicitation$_2$ Phase, Subject UR's productivity immediately improved to a stable average of 69% which was just above the criterion level for supervisor praise. The within-phase trend for Self-Solicitation$_2$ Phase was -.0043.

Although the Self-Solicitation procedures were set up to be used with vocational behaviors that were not maintaining, they were also applied with 2 subjects (AM and AK) who did not demonstrate maintenance problems after training. Figure 5 presents these data. Subject AM demonstrated a mean productivity of 51% during the Production Phase on the task of Busing with a nearly-flat phase of -.0012. The level in this phase was above that shown during the training phase. Mean productivity during the Self-Solicitation Phase was 41% with a trend across the phase of -.0023. For Subject AK, the Self-Solicitation procedures were introduced on the task of Pots and Pans. During the Self-Monitoring Only Phase mean productivity was 47% with a trend of +.0059. This improving productivity,

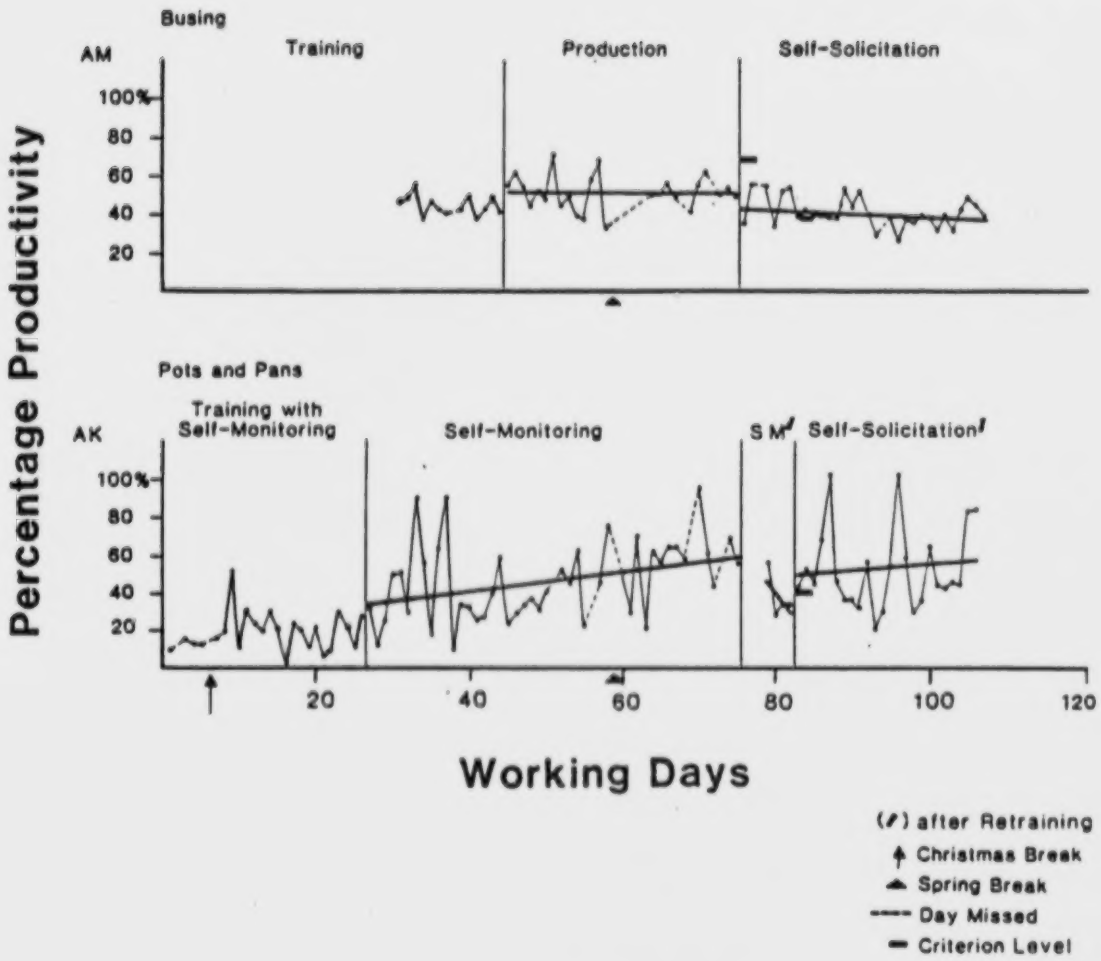

FIGURE 5. Productivity on work tasks for subjects entering self-solicitation phase without performance losses.

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however, was accompanied by a large increase in errors. As such, the next condition on Pots and Pans for this subject was Retraining on the task. Mean productivity after Retraining was 37% with a trend of -.0636. During the Self-Solicitation Phase the mean productivity was 53% with a trend of +.0036. These subjects met the established rate criterion on 61% of the days in the Self-Solicitation conditions (with a range of 54% to 67%).

The Self-Solicitation intervention was not introduced for every subject on every task. There were four subject/task series (for 3 subjects) where no maintenance problems were demonstrated and these were not manipulated. These included three series with 2 subjects who Self-Monitored after Training (Subject HS, Pots and Pans and Restock; Subject AK, Take Down) and 1 subject who entered the Production Phase after Training (AM, Restock). The productivity for these subjects can be seen in Figure 3.

Self-Monitoring Accuracy

Table 8 presents data on the accuracy of Self-Monitoring by each subject for each task. Subjects' accuracy on Self-Monitoring averaged 91.29% during Self-Monitoring and Self-Solicitation Phases. Accuracy ranged from 79% for Subject HS (during Self-Monitoring on Pots and

Pans) to 98% for Subjects HS AG, and UR (all during Self-Solicitation on Dishes).

There were 4 subjects who received booster training on the use of the counters during the study when accuracy fell

TABLE 8. Self-Monitoring Accuracy

Subject	Task	Phase	Units % Accuracy	% of Days Time Accurate
AG	Pots and Pans	S-M[a] only	90%	78%
		S-S[b]	90%	73%
		S-S',[c]	92%	95%
	Dishes	S-M only	88%	64%
		S-S	98%	62%
HS	Restock	S-M only	96%	91%
	Pots and Pans	S-M only	79%	84%
		S-M'[d]	84%	83%
AK	Take Down	S-M only	93%	83%
	Pots and Pans	S-M only	91%	96%
		S-M'	91%	100%
		S-S'	94%	100%
AM	Busing	S-S	82%	74%
LG	Dishes	$S\text{-}S_1$	95%	95%
		$S\text{-}S_2$	98%	94%
	Pots and Pans	S-S	95%	96%
		S-S'	97%	100%
UR	Dishes	$S\text{-}S_1$	85%	63%
		$S\text{-}S_2$	98%	86%

[a] S-M = Self-Monitoring.

[b] S-S = Self-Solicitation.

[c] S-S' = Self-Solicitation after Retraining.

[d] S-M' = Self-Monitoring after Retraining.

below 80% for 2 consecutive days. Subject AG received one booster session on Dishes and two sessions on Pots and Pans during the study. Subject HS received one booster session on Pots and Pans. Subject AK received two booster sessions on Pots and Pans. Subject AM received two booster sessions on Self-Monitoring on Busing.

Subjects used the timing devices accurately on the average of 86% of the time. The range of appropriate use of the timing devices was 62% for Subject AG during the Self-Solicitation Phase on Dishes to 100% for Subject AK during the Self-Solicitation Phase on Pots and Pans and Subject LG during the first Self-Solicitation Phase. The subjects with the lowest correct use of the timing devices included Subjects AG, AM, and UR. Subjects AM and UR used a timer rather than a stopwatch. Subject AG demonstrated less accuracy using a stopwatch on Pots and Pans (62-64%) than on Dishes (73-95%).

Self-Monitoring Error Analysis

Table 9 presents the distribution of Self-Monitoring overestimate and underestimate errors related to units completed. When errors occurred, 2 subjects consistently underestimated their observed performance. The remaining 4 subjects were more likely to overestimate the number of

TABLE 9. Nature of Self-Monitoring Errors

Subject	Task	Phase	% of Errors as Overestimates of Units Completed	% of Errors as Underestimates of Units Completed
AG	Pots and Pans	S-M[a] only	38%	62%
		S-S[b]	43%	57%
		S-S'[c]	33%	67%
	Dishes	S-M only	38%	62%
		S-S	38%	62%
HS	Restock	S-M only	83%	17%
	Pots and Pans	S-M only	50%	50%
		S-M'[d]	46%	54%
AK	Take Down	S-M only	86%	14%
	Pots and Pans	S-M only	74%	26%
		S-M'	100%	0%
		S-S'	91%	9%
AM	Busing	S-S	0%	100%
LG	Dishes	$S\text{-}S_1$	60%	40%
		$S\text{-}S_2$	100%	0%
	Pots and Pans	S-S	75%	25%
		S-S'	75%	25%
UR	Dishes	$S\text{-}S_1$	0%	100%
		$S\text{-}S_2$	0%	100%

[a] S-M = Self-Monitoring.

[b] S-S = Self-Solicitation.

[c] S-S' = Self-Solicitation after Retraining.

[d] S-M' = Self-Monitoring after Retraining.

units completed when self-monitoring errors occurred. No pattern of errors was evident related to the specific tasks or phases. For Subject AG, more than 60% of the errors on both tasks in recording the number of units completed were underestimates of the actual number. For Subject HS, the types of errors were nearly equal for Pots and Pans; however, most errors (83%) on the Restock task were overestimates. For Subject AK, 86% of the errors on the Take Down task were overestimates; for Pots and Pans, more than 75% were overestimates. For Subjects AM and UR, all errors in units completed were underestimates. Subject LG demonstrated most errors (75%) as overestimates on Pots and Pans and most (83%) underestimates on Dishes across the two Self-Solicitation Phases.

Acquisition of Self-Solicitation Procedures

Table 10 presents data related to acquisition of the behaviors for using the self-evaluation procedures of the Self-Solicitation Phase. For subjects who had previously learned to Self-Monitor, an average of 6.67 sessions were required to reach criterion with a range of 2 for Subject AG on Pots and Pans to 10 for Subject AK on Pots and Pans. For subjects who learned Self-Monitoring at the same time as the Self-Solicitation procedure, an average of 3.75

TABLE 10. Acquisition of Self-Solicitation Procedures

Subject	Task	Previously Learned Self-Monitoring?	Number of Sessions
AG	Pots and Pans	yes	2
	Dishes	yes	8
AK	Pots and Pans	yes	10
AM	Busing	no	4
LG	Pots and Pans	no	2
	Dishes	no	3
UR	Dishes	no	6

sessions were required with a range of 2 sessions for Subject LG on Pots and Pans to 6 sessions for Subject UR on Dishes. Subjects AM and UR, as previously noted, were trained to identify if the criterion had been met by whether or not a static number of units was displayed on the counter. All other subjects utilized the L-shaped ruler and conversion chart to determine if the criterion had been met.

Accuracy of Decisions Related to Reaching Criterion During Self-Solicitation Phase

Data were collected on whether or not subjects in the Self-Solicitation Phase accurately determined if the

criterion for work rate or productivity had been met for each day by recording a "+" or "-" in their notebooks. Table 11 presents these data. Subjects during Self-Solicitation Phases accurately determined whether or not they had reached criterion 94.4% of the time. The lowest accuracy on this measure was 84% for Subject AM on Busing. There was 100% accuracy for Subject AK on Pots and Pans, Subject LG on Pots and Pans, and Subject UR on Dishes. All of the errors for Subject AG and Subject LG involved recording a "+" when a "-" was true. For Subject AM, all errors involved recording a "-" when a "+" was true.

TABLE 11. Accuracy of Decisions About Reaching the Daily Criterion

Subject	Task	% Days Correct Decision Made	Nature of Errors
AG	Pots and Pans	95%	All recorded as "+" when "-" was true
	Dishes	90%	All recorded as "+" when "-" was true
AK	Pots and Pans	100%	----
AM	Busing	84%	All recorded as "-" when "+" was true
LG	Pots and Pans	100%	----
	Dishes	92%	All recorded as "+" when "-" was true
UR	Dishes	100%	----

Supervisor Contacts

In addition to the data collected on the dependent variables reported above, data were collected on the frequency and duration of contacts with subjects by the supervisors and staff at each restaurant. Table 12 presents these data for all phases after the initial Training Phase for each subject on each task. Data are reported as the average number of contacts per day and the average minutes per contact. These data indicate that subjects received contacts from supervisors infrequently, averaging less than one contact per person per task per day ($\bar{X}$ = 0.67) for those subjects in the University restaurant. Further, the duration of contacts was short, averaging less than 1 minute per contact.

For subjects at the University of Oregon restaurant, contacts averaged less than one per day except for Subject HS on Pots and Pans during Self-Monitoring (1.76) and Subject AG on Dishes (1.18) during the phase of Self-Monitoring Only. Subject UR, who worked in the downtown restaurant, received the most contacts from supervisors ($\bar{X}$ = 4.3 per day). This setting was one where all restaurant employees including the owner worked in close proximity to one another. The duration of contacts for Subject UR were recorded as estimates since nearly all

TABLE 12. Frequency and Duration of Supervisor Contacts

Subject	Task	Phase	Average Contacts Per Day	Average Minutes Per Contact
AG	Pots and Pans	S-M[a] only	0.83	1.43
		S-S[b]	0.31	0.38
		S-S'[c]	0.88	0.61
	Dishes	S-M only	1.18	2.00
		S-S	0.86	1.38
HS	Restock	S-M only	0.87	0.77
	Pots and Pans	S-M only	1.76	0.81
		S-M'[d]	1.23	0.80
AK	Take Down	S-M only	0.63	1.64
	Pots and Pans	S-M only	0.57	1.27
		S-M'	0.50	0.50
		S-S'	0.59	0.81
AM	Busing	Production	0.46	0.81
		S-S	0.23	1.50
	Restock	Production	0.45	0.98
LG	Dishes	$Production_1$	0.42	3.40
		$S\text{-}S_1$	0.35	1.09
		$Production_2$	0.20	0.75
		$S\text{-}S_2$	0.75	1.67
	Pots and Pans	Production	0.37	1.15
		S-S	0.52	0.54
		S-S'	0.67	0.67
UR	Dishes	$Production_1$	3.34	0.50[e]
		$S\text{-}S_1$	4.00	0.50[e]
		$Production_2$	6.00	0.50[e]
		$S\text{-}S_2$	3.86	0.50[e]

[a] S-M = Self-Monitoring.

[b] S-S = Self-Solicitation.

[c] S-S' = Self-Solicitation after Retraining.

[d] S-M' = Self-Monitoring after Retraining.

[e] Estimated value.

contacts were very brief given the small working environment and the exchange of comments in that setting.

Task Errors

Table 13 presents data on the percentage of task performance errors for each subject after the Training Phase. Errors occurred at much higher rates on the task of Pots and Pans than on any other task. For tasks other than Pots and Pans, the average percentage of errors was 7.2% for all posttraining phases with a range of 0.4% for Subject AM on Restock to 22.7% for Subject AG on Dishes. For the task of Pots and Pans, the percentage of errors was 41.3% across posttraining phases. For each subject assigned this task, errors increased in all posttraining phases. The range of errors was 18.9% for Subject LG in the Production Phase to 56.0% for Subject AG in the Self-Solicitation Phase. After the initial training phase there was a clear upward trend in percentage errors. This was true for the subject entering the Production Phase (Subject LG) and for subjects entering Self-Monitoring phases (Subjects AK, HS, and AG). Further, the percentage of errors continued to increase for subjects entering the Self-Solicitation Phase (Subjects AG and LG).

TABLE 13. Errors

Subject	Task	Phase	Percentage Errors
AG	Pots and Pans	S-M[a] only	39.0%
		S-S[b]	49.5%
		S-S'[c]	34.4%
	Dishes	S-M only	9.7%
		S-S	22.7%
HS	Restock	S-M only	1.1%
	Pots and Pans	S-M only	44.8%
		S-M'[d]	29.7%
AK	Take Down	S-M only	19.3%
	Pots and Pans	S-M only	42.8%
		S-M'	8.1%
		S-S'	23.5%
AM	Busing	Production	4.5%
		S-S	4.0%
	Restock	Production	0.4%
LG	Dishes	$Production_1$	3.8%
		$S\text{-}S_1$	2.0%
		$Production_2$	7.4%
		$S\text{-}S_2$	5.3%
	Pots and Pans	Production	18.9%
		S-S	46.3%
		S-S'	32.7%
UR	Dishes	$Production_1$	9.9%
		$S\text{-}S_1$	7.6%
		$Production_2$	6.8%
		$S\text{-}S_2$	3.5%

[a] S-M = Self-Monitoring.

[b] S-S = Self-Solicitation.

[c] S-S' = Self-Solicitation after Retraining.

[d] S-M' = Self-Monitoring after Retraining.

For all 4 subjects assigned to the task of Pots and Pans (AK, HS, AG, and LG), a Quality Training Phase was introduced (indicated by the ' [prime] on phase designations) per the procedures in Chapter II. The Retraining Phase was introduced using a multiple baseline across subjects. This Quality Retraining was also introduced across Self-Monitoring and Self-Solicitation Phases with 2 subjects in Self-Monitoring when Retraining occurred and 2 subjects in Self-Solicitation when Retraining occurred. Following this Retraining, errors on Pots and Pans averaged 22.56% with a range of 8.10% for Subject AK in Self-Monitoring' Only to a high of 34.40% for Subject AG in Self-Solicitation'. Figure 6 shows the percentage error on Pots and Pans for all phases for all subjects. For all subjects there was an immediate drop in the percentage of errors on the task of Pots and Pans after the 2 days of Retraining. While all subjects showed some increase across the remainder of the phase, 3 of the 4 subjects demonstrated stable or decreasing trends in percentage errors across the phase.

Subject AK's errors after Retraining were 23.5% compared to 42.8% for the Self-Monitoring Only Phase. Errors in the final phase increased early in the phase then stabilized and went downward.

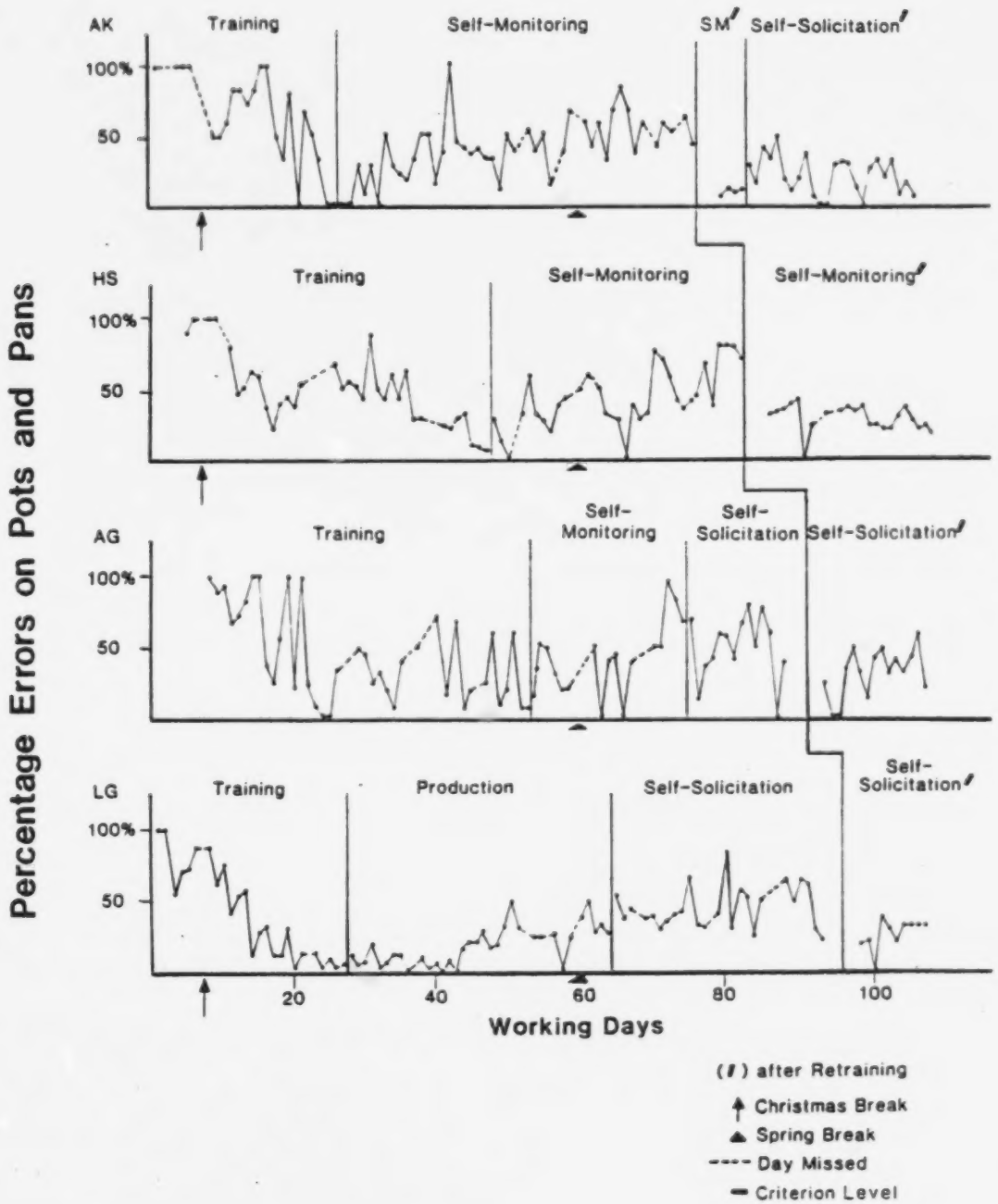

FIGURE 6. Percentage errors on pots and pans.

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Subject HS demonstrated errors of 44.8% during the Self-Monitoring Only Phase. Errors after Retraining were 29.2% with a nearly flat trend at the end of the phase.

Subject AG demonstrated variable error rates during the Self-Monitoring Only Phase and Self-Solicitation Phase. The mean errors during Self-Monitoring Only were 39%. During Self-Solicitation the error rate was 56%. After Retraining the mean error rate was 34.4%.

Subject LG demonstrated an increasing trend in errors on Pots and Pans during the Production Phase with n average of 18.9% errors. Errors in the Self-Solicitation Phase for Subject LG averaged 46.3%. Errors after Retraining averaged 32.7% with an initial upward trend after which the trend was flat.

CHAPTER IV

DISCUSSION

This study investigated the effects of Self-Monitoring and Self-Solicitation of Feedback utilizing a self-management procedure in which subjects evaluated their own work performance. It adds to the existing body of research in several ways by: providing data related to the effects of self-monitoring; providing data related to the use of self-management procedures in real-world, integrated job settings over a period of months; employing a strategy for self-evaluation that gives greater control to the worker; and, using a strategy for solicitation of feedback that is manageable without a high supervisor cost. In addition, this study raises questions for future research regarding the use of self-management procedures in integrated job settings.

The central issue in this study was the need for applied procedures for maintaining work behavior with persons who have severe disabilities. The national focus on supported employment emphasizes the need for practical procedures that can be applied in nonsegregated job

settings by job coaches and trainers responsible for the development and maintenance of work skills with employees with severe disabilities. Procedures must not be only workable but also manageable within existing resource constraints.

It was hypothesized that young adults with severe handicaps would learn and maintain Self-Monitoring and Self-Solicitation procedures, and that the Self-Solicitation of Feedback would be more effective in increasing and maintaining work behaviors than Self-Monitoring alone. The design of the study was premised on expected decrements in performance in phases with Self-Monitoring Only or in Production without Self-Monitoring. The results of the study suggest that Self-Solicitation improved work performance with behaviors when losses in productivity occurred.

The remaining portions of this chapter provide a discussion and analysis related to (a) the effects of the Self-Solicitation procedure, (b) the effects of Self-Monitoring, (c) the accuracy of subject Self-Monitoring, and (d) the substudy of errors on the task of Pots and Pans across subjects.

Effects of Self-Solicitation

For those subjects who did not maintain productivity levels after training, the Self-Solicitation intervention resulted in clear and immediate improvements in work performance that sustained over time. Subjects with performance losses demonstrated an immediate shift in trend and/or level with the onset of the Self-Solicitation intervention. The pattern of improvement for these subjects shows immediate effects with an overall pattern of stabilizing at higher rates than in the previous phase. However, even with clear shifts in trend or level, some variability of day-to-day performance continued in most cases during Self-Solicitation Phases. This variability may be partially due to the nature of the tasks in the study.

Data for subjects with performance losses after training show that maintenance was improved with Self-Solicitation. Work performance maintained over longer periods of time with the Self-Solicitation intervention than during the Production and Self-Monitoring Only Phases. When losses occurred in the early phases, they were evident within a few weeks after the beginning of the phase. That performance improved with Self-Solicitation can most likely be attributed to the fact that subjects now had a strategy

for immediately evaluating their own performance and for gaining accurate and timely feedback from a supervisor based on their own evaluation. In addition to providing a method for workers to solicit feedback, the present intervention also provides a system which improves the accuracy of feedback that supervisors provide to individual workers. With this strategy supervisor behavior is also modified resulting in regular, accurate, and prompted data-based feedback to workers.

Unlike some previous studies on self-management (e.g., McNally et al., 1984), the present study did not rely significantly on externally-provided backup reinforcers for acceptable performance. The present intervention relied, instead, on the subject's evaluation of performance and provided only brief external social feedback based on the individual's decision about acceptable performance.

The multiple baseline across behaviors and the use of reversals demonstrated experimental control in the study related to the effects of Self-Solicitation. For Subjects AG and LG, no changes in the performance on their second task occurred as improvements were shown on the first work task with the introduction of Self-Solicitation of Feedback. With both subjects, the effects of the intervention were immediate when introduced on the second work task.

The use of a withdrawal phase for 2 subjects (LG and UR) further supports the effects of the intervention and demonstrates experimental control. The data indicate a small to moderate loss in performance once the intervention was withdrawn. In neither case did performance drop to the level demonstrated in the Production Only Phase. This may be attributable to the fact that--whereas the timing, counting devices, and the external feedback could be withdrawn--the presumed learning that there was a criterion for acceptable performance could not be withdrawn. Thus, subjects may have continued to self-evaluate their performance in some fashion even in the absence of the devices and external feedback. Even so, both subjects demonstrated further increases in productivity upon the reintroduction of the intervention. These data can be considered in relation to the study by Hanel and Martin (1980) who reported that, upon withdrawal of a self-management package (self-monitoring, self-delivery of tokens, and goal-setting), 4 of 6 subjects showed no loss in performance. These authors suggest this may have been due to length of self-management phase. Some form of continued self-evaluation by subjects was possible even though the tools of self-management and the feedback were withdrawn.

For 2 subjects, the Self-Solicitation intervention appeared to have had little effect. These were also the two cases where there was not a loss in performance in the Production conditions and Self-Monitoring Only conditions. Although this could be viewed as a failure of the intervention, it can also be viewed as supporting the original hypothesis that the intervention would improve and maintain behavior whenever a loss of performance became evident.

The fact that not all of the subjects demonstrated a loss in productivity in Production or Self-Monitoring Phases provides important information. It suggests that maintenance cannot be assumed to be a problem: Some workers will maintain acceptable levels of performance without additional intervention. Although long-term work performance is of concern in some situations, it is important to first establish that there is a problem needing attention before implementing an intervention.

Other researchers have reported some variability in the effects of self-management in vocational settings with persons having mental disabilities. Wehman et al. (1978) suggested that the failure of self-delivered reinforcers to improve behavior with 1 subject may have been related to the severity of this subject's disability. Hanel and Martin (1980) stated that it was the individuals who worked

the most slowly that demonstrated the least improvement with the self-management system. Srikameswaran and Martin (1984) reported that 1 of their 4 subjects failed to show improvement with self-management procedures using money as a backup reinforcer, whereas small improvements in performance resulted when edibles were used as backup reinforcers. These studies indicate that effects may be related to level of disability and the type of reinforcer. Based on available subject characteristics and the resulting data, the present study does not support this hypothesis.

Effects of Self-Monitoring

Of the 3 subjects who engaged in Self-Monitoring without input on performance, losses in performance were evident for only 1 subject. Of the 3 subjects who experienced the Production only condition, losses in performance were evident for 2 subjects. These data are difficult to interpret given the design of the study, the task-related variables, and the individualized performance patterns. The patterns can only be noted. Subjects AK and HS demonstrated highly accurate self-monitoring without losses in performance. Even though no performance level was suggested and no feedback was provided, these subjects continued to accurately self-monitor. Informal observations indicate

that these 2 subjects sometimes made comments to coworkers and supervisors about the number of units they had completed based on the numbers on their counters. This might be interpreted as some form of self-evaluation.

Self-Monitoring Accuracy

Subjects in the study self-monitored their work performance with high accuracy. In addition, subjects were able to manage the timing devices and the recording system. This is important for at least three reasons. First, self-monitoring is a necessary component of any self-management procedure. Second, it is clear that accurate data on performance can be collected and recorded without continuous supervisor monitoring; that is, it is possible to acquire performance data without supervisor presence. Third, the system for self-monitoring employed in this study built in both the time spent working and self-recording of units completed. Adding the time component provides greater control to the individual. Providing a system wherein the individual manages the time element results in greater independence and can be workable in job settings even when there is variability in the amount of time spent working on given tasks.

All subjects self-monitored with an average exceeding 80% accuracy. The nature of self-monitoring errors committed appear to be idiosyncratic. That is, 1 subject consistently overestimated units completed when errors were committed; 3 subjects consistently underestimated units completed; and, 2 subjects demonstrated inconsistent error patterns. The nature of the error patterns did not seem to be related to task differences or to the phases of the study.

Task Errors

Consistent patterns of errors emerged only on the task of Pots and Pans. All subjects assigned to this task demonstrated high error rates. In all cases, some increase in errors was evident soon after training. It can be hypothesized that the consistent pattern of errors on this task is related to the difficulty of pot scrubbing. All other tasks in the study were such that, following the processes for task completion, accurate task completion was likely to result. The same cannot be said for scrubbing pots and pans. Engaging in the correct sequence of steps for pot scrubbing does not necessarily result in clean pots and pans. The response cost for properly cleaning pots and

pans is much higher than for meeting the quality standards of other tasks in the study.

The retraining on Pots and Pans resulted in a decrease in errors on this task; however, errors were not eliminated. The error remediation strategy was one designed to be consistent with the major intervention of the study. That is, the intervention was designed to rely on subject-controlled contingencies rather than externally-controlled contingencies. Therefore, only a brief retraining period occurred, before and after which no feedback on work quality was provided.

This raises an important problem in the area of self-management procedures and demonstrates the need to devise strategies that address both rate and quality. Subjects were trained to specific quality criteria on each task, yet consistent errors only emerged from the task of Pots and Pans. Subjects were trained to self-monitor correct units of work completed. For Pots and Pans, the quality levels were not maintained after training. Subjects self-monitored units completed whether or not those units were correct. Whereas the retraining intervention reduced errors on Pots and Pans, it did not eliminate errors and demonstrates the need to devise a method for incorporating a quality criterion into self-management interventions for

tasks such as Pots and Pans, where there is a high response cost for quality performance.

A few of the studies discussed in Chapter I reported data on work quality (Horner et al., 1979; Srikameswaran & Martin, 1984; Zohn & Bornstein, 1980). However, issues related to the effects of self-management practices on work quality have not been addressed. The present study suggests that losses in quality had to do with the nature of the task. There is not evidence that the quality loss was due to the introduction of Self-Monitoring or Self-Solicitation. Rather, quality losses were evident in every posttraining phase. Training to a specific criterion seemed sufficient on all other tasks (except Pots and Pans) to maintain reasonable quality of performance.

It is insufficient to merely add the counting of correct units to the self-monitoring procedures. A subject may always record a unit as correct. That is, the subject would record it as correct: if it were performed correctly; if it were performed incorrectly, checked, and then redone correctly; or, if it were thought to be completed correctly. To maintain quality on such tasks using external feedback runs counter to the purpose of using self-management practices--namely, to reduce supervisor presence and feedback. Clearly, strategies are needed to

address the issue of work quality in addition to work rate on such tasks.

Implications for Practitioners

The results of this study can provide suggestions to practitioners interested in using a self-solicitation of feedback procedure to increase and maintain work performance in job settings with persons labeled severely handicapped. Practitioners should:

1. Establish a measurement system. This study and others emphasize the importance of establishing a method for acquiring accurate data related to work performance in integrated job settings. It is possible and desirable to establish a measurement system even with job tasks considered to be difficult to measure, such as restaurant-related jobs. In the absence of accurate data, it is impossible for supervisors to provide accurate feedback to individual workers.

2. Create a self-monitoring system that is manageable by individual workers. The results of this study suggest that it is possible to acquire accurate data from individual workers about their task performance. Liberty (1984) points out that there are numerous options for self-monitoring which make it easier to collect data about the

performance of persons with severe handicaps. The present study provides a strategy for dealing with the element of time in self-monitoring task performance by utilizing stopwatches and timers, in addition to self-monitoring units completed. Self-monitoring is a required first step in utilizing other self-management procedures; the present study confirms the ability of persons with severe handicaps to accurately self-monitor their behavior.

3. Establish a system for self-evaluation and self-solicitation of supervisor feedback. As with establishing a manageable self-monitoring procedure, it is important to devise a system wherein individual workers can self-evaluate performance and solicit feedback from supervisors. The intervention in this study devised a method for individuals to determine whether or not their performance was acceptable and allowed for variation in the amount of time spent working on a task. Following self-evaluation, a worker can then present their decision to a supervisor to gain accurate feedback immediately upon completion of the task.

4. Implement a self-solicitation procedure when a maintenance problem is present. If a measurement system has been devised and individuals have been trained to accurately self-monitor, it will be possible to decide if a

self-solicitation intervention is needed. Then, if maintenance problems emerge, such a strategy can be implemented to improve and maintain performance.

5. Periodically check the accuracy of worker self-monitoring. A number of studies confirm that persons with severe handicaps can accurately self-monitor. Even so, periodic checks of the accuracy of self-monitoring will increase supervisor confidence in the information provided by the individual workers about their work performance and aid in making data-based decisions about possible interventions.

Limitations of the Study

The first limitation relates to the fact that the design was driven by expected losses in performance by subjects after training. In situations where the loss of performance occurred, the Self-Solicitation intervention appeared to be effective. Since there was not a loss in performance after Training for all subjects, it was not possible to replicate the results on all tasks for all subjects.

The second limitation of this study was that it was conducted in real-world restaurant settings utilizing a number of work tasks that were a part of day-to-day

restaurant operations. Since subjects were assigned to tasks based on needs and schedules, it was not possible to sort out possible effects related to types of work tasks.

A third limitation related to the Self-Solicitation of Feedback. This study included a strategy which enabled subjects to evaluate their work performance on each task daily. It also included a brief social reinforcer or punisher provided externally based on the subject's initiation. The differential effects of these two components cannot be isolated. It is clear that the intervention did not rely primarily on major externally-controlled backup reinforcers but, rather, relied on social input initiated by the subjects.

Future Research

The present study supports the effectiveness of self-management procedures in vocational performance with persons labeled severely handicapped. It also raises additional research needs.

1. Effects of Self-Monitoring. A review of the literature indicates variable effects of self-monitoring alone. This study provides additional data but the long-term effects of self-monitoring under such conditions still remain unclear. Studies are needed which investigate the

long-term use and effects of self-monitoring. The effects of self-monitoring over greater periods of time must be identified. Research is needed which investigates performance over a period of months in situations where it is possible to allow researchers to determine if self-monitoring alone promotes maintenance or if its effects are relatively temporary (as Kazdin, 1974, has suggested for other populations). In the present study it is possible that 2 subjects engaged in some form of self-evaluation during Self-Monitoring Phases even in the absence of feedback on performance. Studies are needed which compare self-monitoring with self-evaluation in the absence of self-solicitation of feedback. Investigations into why some people maintain performance and others do not would contribute important information.

2. Effects of Task Variables. The present study investigated self-management procedures across subjects and tasks. In this study, there was variability in performance across both tasks and subjects. Studies are needed in nonsegregated job settings which hold constant task variables in order to permit analysis of self-management variables in the absence of task-to-task variables.

3. Incorporate Self-Managed Quality Conditions. The present study utilized a self-management procedure related

to rate of performance. The data obtained on the task of Pots and Pans point out the need to incorporate quality features into self-management intervention strategies. At issue here is the need to devise methods which maintain quality on such tasks without continuous reliance on external contingencies. Studies are needed that focus on tasks where quality can be expected to be an issue. Research including a comparison of externally-managed quality contingencies versus self-managed quality contingencies can provide needed information to practitioners in employment settings.

4. Studies in Applied Settings. This study is one of small number of studies investigating the use of self-management procedures in real-world job settings. Although such settings create challenges related to conducting research, data from these settings are needed in order to document approaches to maintaining work performance. Of the few studies reviewed which were conducted in integrated job settings, only one investigated self-monitoring procedures. Studies are needed which investigate in greater depth the impact of self-management procedures to maintain performance using self-monitoring, self-solicitation of feedback, self-evaluation, and self-delivery of consequences. Furthermore, studies which utilize strategies

that are manageable in nonsheltered settings with low staff-to-worker ratios would be beneficial.

5. Effects of Self-Management Procedures Over Longer Periods of Time. This study has provided data over more than 5 months of performance, terminated by the ending of the school year. More studies are needed which address the use of self-management procedures related to maintenance over longer periods of time. Future studies should investigate maintenance over many months of working and include subject variables related to idiosyncratic effects of self-management interventions.

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